T, NOVEMBER 5, 1936 FIRST AERO WEEKLY IN THE WORLD REGD. AT THE G.P.O. AS A NEWSPAPER

Engin. Library

NOV 18 1936

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

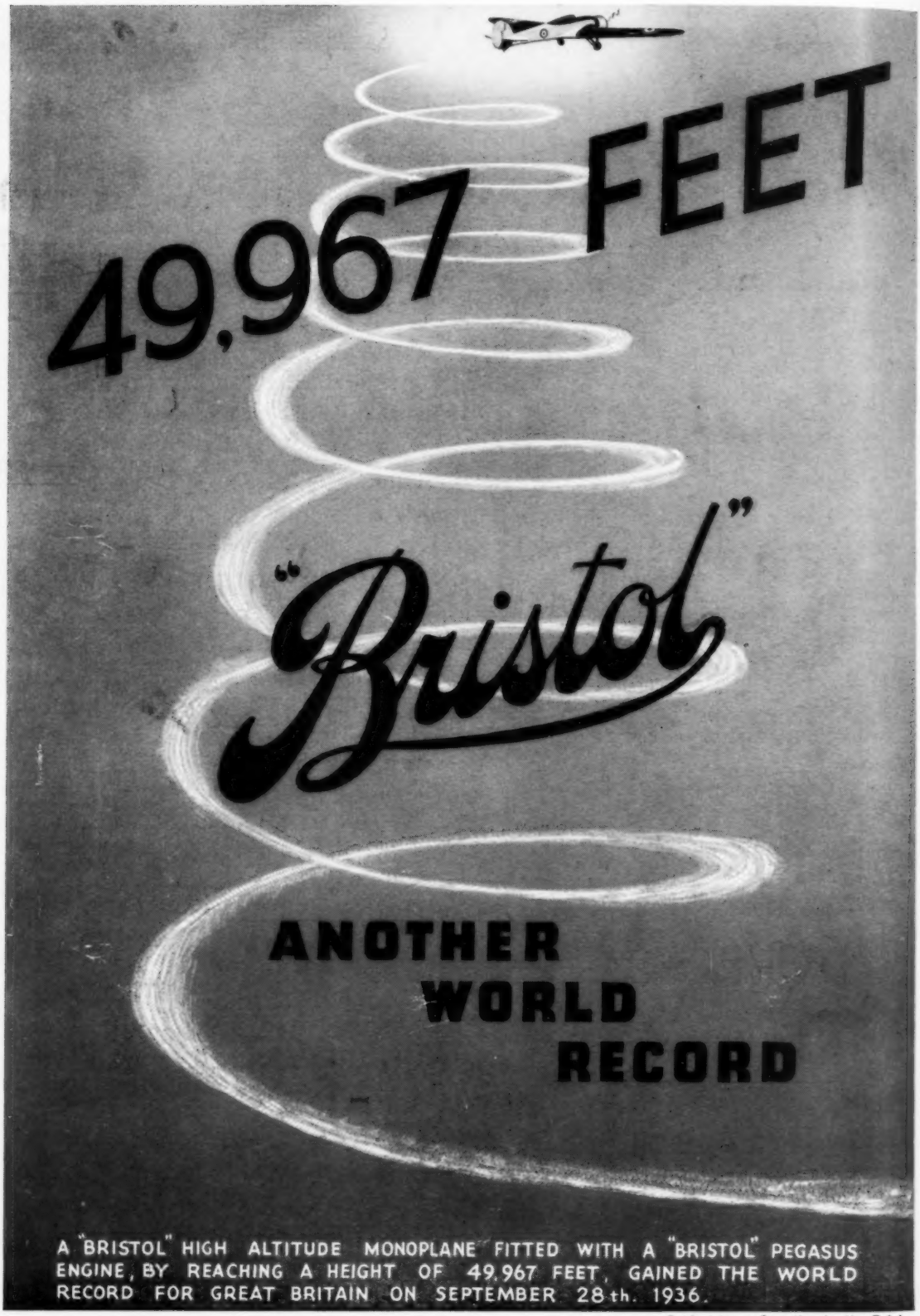
SIXPENCE EVERY THURSDAY

RELY ON DUNLOP

DUNLOP RUBBER CO. LTD., FORT DUNLOP, BIRMINGHAM
Branches throughout the World.

TYRES WHEELS & BRAKES

C.F.H.


49,967 FEET
"Bristol"
ANOTHER WORLD RECORD
A "BRISTOL" HIGH ALTITUDE MONOPLANE FITTED WITH A "BRISTOL" PEGASUS ENGINE, BY REACHING A HEIGHT OF 49,967 FEET, GAINED THE WORLD RECORD FOR GREAT BRITAIN ON SEPTEMBER 28th. 1936.

Subject to confirmation by the F.A.I.

THE BRISTOL AEROPLANE CO. LTD., FILTON, BRISTOL

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1

Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (50 lines).

HERTFORD ST., COVENTRY.	GUILDHALL BUILDINGS, NAVIGATION ST., BIRMINGHAM, 2.	260, DEANSGATE, MANCHESTER, 3.	26B, RENFIELD ST., GLASGOW C.2.
Telegrams: Autocar, Coventry. Telephone: Coventry 5210.	Telegrams: Autopress, Birmingham. Telephone: Midland 2971.	Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.	Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0. 6 months, 16s. 6d. 3 months, 8s. 6d.
Other Countries: Year, £1 15 0. 6 months, 17s. 6d. 3 months, 8s. 9d.

No. 1454. Vol. XXX. NOVEMBER 5, 1936. Thursdays, Price 6d

The Arms Commission

SIR J. Eldon Bankes and his colleagues on the Royal Commission on the Private Manufacture and Trading in Arms deserve sympathy. Their Royal Commission was dated February 20, 1935, and their report was submitted on September 24, 1936. In the meantime the expansion of our defence forces was decreed, and the Committee of Imperial Defence reviewed the civil industry and allotted firms for particular types of war production. In particular the aircraft "shadow industry" (which is dealt with on pages 459 and 460 of this issue) was set in motion by the Air Ministry. Therefore, if the Arms Commission had reported against the private manufacture of arms, it is hard to see how any official action could have been taken on their recommendations. For this reason, if for no other, it may be counted fortunate that the Commission has come to the conclusion that the private manufacture of arms must continue.

It goes without saying that every right-minded person must wish that the necessity for arming did not exist. Likewise, everyone must wish that there were no criminals to make necessary the maintenance of a police force. But, with the world as it is, force is the only way in which both crime and unjust aggression can be restrained, and Britain, like other countries, must have armed forces as well as a constabulary. It follows that the most vital question for us is how best we may provide the arms which, unfortunately, are so necessary. That question must override all others. Everyone who was in the trenches in 1915 knows what avoidable casualties were suffered by the British Army through the shortage of shells and of other forms of armament. It is certainly a fault, almost a crime, to send men out to fight without providing them with a sufficiency of proper weapons. If ever Britain should again be driven to the tragic necessity of war, that fault must not be repeated. With such a responsibility for the lives of our sailors, soldiers and airmen (to say nothing of the possibility of a national defeat), the Government cannot afford to judge this question on the highest moral grounds; it must give chief weight to practical necessities.

The Royal Commission has come to the conclusion "that the necessities of Imperial defence cannot be effectively met, in existing circumstances, except by the maintenance in peace-time of a system of collaboration between the Government and the private industry of the country in the supply of arms and munitions." This is the most important finding of the Commission. It will doubtless cause sorrow to those who, in the words of the report, "project their hatred of war on to the instruments of war in a belief that the control of the one will lead to the suppression of the other," but, in truth, there is no cause for either joy or sorrow in the finding. We are convinced that the finding of the Commission is based on common sense and points the best way to obtaining security. It gives a *post factum* blessing to the steps already taken to enlist the private manufacturers of the country in the building up of reserves which would be a sheer necessity in case of war.

Making It Pay

ANYONE who has taken the trouble to work out air transport costs in relation to the number of useful flying hours will have been somewhat staggered by the way in which these costs go down as the mileage or hourage goes up. In approximate terms, a ten/fourteen-seater machine can be kept in the air during an hour for £10 when the yearly hourage is 500; if this flying time is increased to 2,000 hours, however, the running costs decrease to a matter of £5 for every hour. Furthermore, the overhead

charges, which remain virtually constant, will become a manageable proportion of the total running costs once a figure of 1,000 hours is exceeded. If an operator dares to do four times as much flying his running costs will only be doubled. With the greater number of useful services which such an increase would demand, it might reasonably be expected that a far greater proportion of passengers would make use of such services, particularly as the fares could be reduced to an attractive figure.

On the face of it the whole principle appears to be too simple to be worth mentioning. The difficulty, as everyone knows, is to discover a way of putting in useful hours. The immediate answer is: Fly by night. But there are disgracefully few aerodromes with adequate night landing equipment. Until they have it the operators cannot fly by night, and until these operators show some enthusiasm for night services neither the Air Ministry nor the private aerodrome owners will go to the expense of installing it.

However, it is possible for machines to be flown for more than 2,000 hours a year by daylight only. The question is to discover how such a figure can be reached in the course of useful operations.

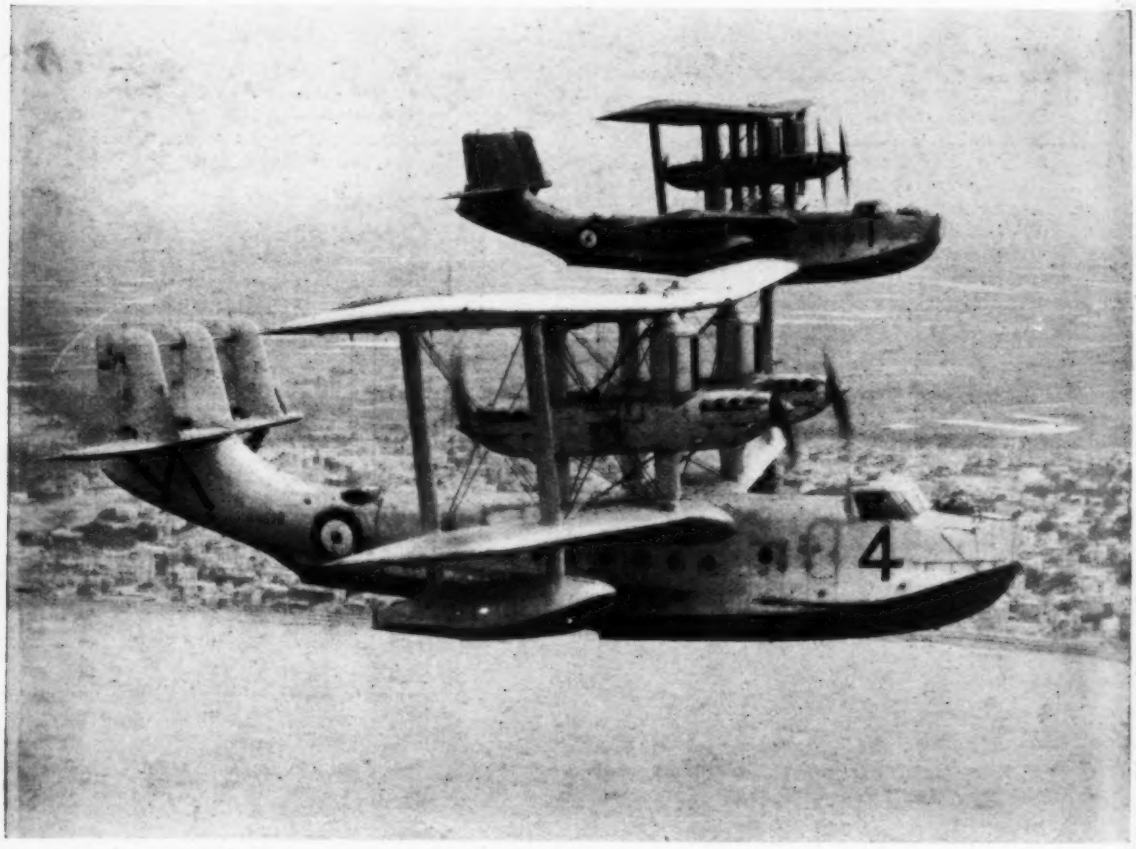
There would appear, at present, to be only one method. The airline fleets must be pooled so that each machine has a chance of flying for an average of at least six hours a day throughout the year. Where the traffic on one company's service only permits a single return journey every day the machines must be taken off, either after the trip or in the interval between the out and home journeys, and flown elsewhere. This suggestion may not be as Utopian as it sounds. Only last week, at the dinner to Mr. Lester Gardner, Mr. Paul Johnston, of our American contemporary *Aviation*, explained how the most significant trend in American air transport was the way in which the operators' experiences were being pooled so that suitable standardised machines could be produced for transport work.

Empty Houses

At the present moment many of our airline companies' operations may be likened to those of a cinema proprietor who expects to make a profit out of one enormous and costly building with seats for only ten persons and staging only one show a day.

For the moment, such a scheme might not be very pleasing to the aircraft manufacturers, but these manufacturers would gain in the long run since the increased efficiency would allow lower fares which, in turn, would encourage more people to fly. Furthermore, the scheme would entail the co-operative planning of services, which itself would inevitably cause the whole internal airline system to be very much more useful to the passenger.

In the meantime we await the findings of the almost forgotten Maybury Committee—in the form, it is to be hoped, of co-ordinated air route recommendations.



125-KNOT CRUISERS: Short Singapore III reconnaissance flying boats of No. 230 (F.B.) Squadron which is being added to the establishment at Singapore. Singapores are still being delivered to R.A.F. units and are powered with four Rolls-Royce Kestrel engines rated at 675 h.p. at 3,000 ft.

The Outlook

A Running Commentary on Air Topics

The "Shadow" White Paper

SO now we know all about it. It was certainly a good deal more than a storm in a teacup, but it hardly deserved all the excitement which it provoked. Admittedly, in time of war or of preparation for a possible (but we hope improbable) war everybody should try to do for his country that which he feels he can do best, and obviously Lord Nuffield was anxious to do that. He will continue to serve the country by making vehicles for the mechanisation of the Army, and Sir Thomas Inskip hopes to get more from Lord Nuffield's factories than has been obtained in the past. That is all to the good.

At the same time, it would be unfair not to give unstinted admiration to those firms who have put the success of the "shadow" scheme before their own individual inclinations. Lord Austin said frankly that, for the sake of his own firm, he would have preferred to make complete engines, and probably the other firms concerned felt the same. None the less, they all decided that the best plan was to make the various parts in various factories, and they sank all individual interests in order to get the best results for the country out of the scheme. Lord Austin's report to Lord Swinton "that they are confident it can be made a success and that they are going to 'see it through'" will go down to history as an example of the patriotic spirit of British manufacturers.

The great surprise sprung by the White Paper is the revelation that the idea of allotting the manufacture of parts to different firms originated with the firms and was accepted with a degree of caution by the Air Ministry. In a good many quarters it had been taken for granted that this proposition was an example of official wrong-headedness and that the scheme had been forced by a bureaucratic Air Ministry down the throats of reluctant manufacturers. Lord Swinton had repeatedly declared in his speeches that his policy has been to go to the manufacturers and tell them what he wanted and to ask them how they could supply it, "as you know more about production than I do." The White Paper proves that he has stuck to this wise policy. Those who jumped to the conclusion that this scheme was a good stick with which to beat the Air Ministry have been left high and dry and must be feeling (as they certainly look) rather foolish.

See How They Fly!

ALTHOUGH the Sopwith Camel gave the optical illusion of having a hump on its back, no one ever thought that the selection of the name was a happy one. Aircraftman Shaw, in the days when he was Col. Lawrence, sometimes grew ecstatic over the qualities of the noble mounts with which the Arabian princes supplied him; but, taken all round, the camel is not a beast which suggests flight through the air.

Squadron heraldry has now arrived to record glorious memories and at the same time to perpetuate the incongruities of aircraft nomenclature. When the Sopwith Camel had won fame as a mighty fighter no one ever thought of the origin of the name. The mere word Camel brought to the mind only ideas of agile aerobatics. Among the squadrons which won fame by their handling of their Camels, none had a higher reputation than No. 45. All who have read Capt. Norman Macmillan's *Into the Blue* will agree. It is not, therefore, surprising that the modern No. 45 (Bomber) Squadron has chosen for its heraldic badge a winged camel, though the beast looks as unnatural as well could be. The motto *Per Ardua Surgo* suggests that the wing loading is high.

No. 27 (Bomber) Squadron has had to face similar, though different, problems. For years it has been stationed in India, and it has commemorated that fact by choosing an elephant as its badge. The motto is *Quam Celerrime ad Astra*. We hope it will be justified.

Imperial Airways' Progress

IT is, perhaps, natural and in accordance with business custom, that in the annual report of Imperial Airways there is no mention of the word "subsidy." At the same time, this omission always seems a trifle unfortunate for the reader of the report, and, in the case of the past year, for the credit of the company. The amount of subsidy paid in any year can be ascertained by hunting through filed papers, but it would be a convenience to have it stated in the report. For instance, in the year which ended on March 31 of this year, for which the directors have just issued a report, the profit for the year amounted to £140,705, as against £133,769 for the previous year. That is a very creditable increase, but when one remembers that the subsidy was reduced last year the rise in profits was actually greater than the figures show. A further sign of prosperity is shown by the recommendation of a bonus of 2 per cent.

Big Traffic Increases

IN the previous year the ton/miles traffic was 3,511,528, and last year it rose to 4,803,427. Increases are shown under passengers and goods on the regular European and Empire services, and there is little cause for regret that fewer passengers used the aircraft of the company for charter and short pleasure flights. Such work is a sideline, and the public which pays the subsidy to the company is only interested in its work on European, and more particularly on Empire, air routes. In the past three years the total traffic of the company has increased by over 100 per cent., and last year the doubling of the Empire services from once a week to twice a week has meant flying an additional 1,300,000 miles during the year. The directors state that this step has been "fully justified."

The Fleet is In

HOW greatly Imperial Airways are in need of their new flying stock emerges from a careful inspection of the page of the annual report devoted to the company's fleet of aircraft. The list covers a total of 76 aircraft, with a total horse-power of 171,030. A footnote explains that the aircraft marked with an asterisk are under construction. There are a great many asterisks!

Giving the company the benefit of three new Empire and long-range Short boats finished, the total fleet of Imperial Airways at the moment is only 37 machines, this number including some ancients Apart from the three new Short monoplane boats, Imperials have but four flying boats left, one being of the Scipio class, and the other three belonging to the Calcutta class.

Among the landplanes two are of the Scylla class, which have the Scipio superstructure on a landplane fuselage. Eight Handley Page 42s are still listed, two being of the 38-passenger type and the others of the 24-passenger, or "eastern," type. Five four-engined A.W. Atalanta class monoplanes are still in service, but the largest number of any one type is the De Havilland 86, with 11 machines.

The rest of the fleet is made up of two Avro 652s, one Avro V and a Westland Wessex.

SUMMER'S END

A Review of the Year's Internal Airline Operations : New Radio Stations in the North : The Map Becomes Temporarily Stabilised

By H. A. TAYLOR

FOR many reasons the autumn is the time at which it is most profitable to examine the year's internal airline progress and to try to gather, if possible, some lessons from a study of the various operations.

While all other methods of transport can carry on in winter to a time-table very similar to that followed during the summer months, it is an unfortunate fact that air transport—or, at least, British internal air transport—must necessarily reduce the extent of its operations. A few simple sums and a moment's consideration of the natural psychology of travellers in general, will show that to this must be attributed the fact that our internal airlines are hardly self-supporting. The vicious circle of demand and supply in the matter of ground equipment may one day cease to be so vicious, and we may eventually develop twelve months a year, twenty-four hours a day services which will give the operator a chance to make money.

Generally speaking, the developments have been of a minor nature. One company has dropped out after running at a loss for some considerable time, and another has reappeared after a period of inaction—enforced by reason of the lack of radio facilities in the North of England.

In this connection, the most striking improvements of the year have concerned the opening of D/F stations at Doncaster, Kirkwall (Orkneys), Newcastle-upon-Tyne, Perth, Sumburgh (Shetland), and Yeadon (Leeds/Bradford). Two of these are of the short-range type, and these stations, which serve the North, are in addition to those which were already in action at Hull, Manchester, Newtownards (Belfast), and Renfrew. Every one of them has been badly wanted for two years or more, if only for the benefit of pilots requiring "fixes." Those in the Orkneys and Shetlands have been more than well deserved by virtue of good work done by Highland Airways, who have had a mail contract more or less from the moment when the post office first began to take an interest in air transport.

A "Pooling" Effect

Remembering the need for big flying-hour totals during a year's operations if a company is going to have a chance to make a profit, Railway Air Services have had, on paper, a better chance than anyone. Route value, however, has a large bearing on the question, since passengers can only be expected to use the air when a definite saving of time and trouble can be expected. All the flying hours in the world are useless if no fares are being taken.

During the summer this company operated over ten separate routes, using two D.H.86As, one D.H. 86, eight D.H.89s, and three D.H.84s. Something of the "pooling" effect, so essential for economic operation, is obtained by the fact that R.A.S. have no pilots or radio operators in their direct employment, but draw on Imperial Airways, which company has contracted both to fly and maintain the fleet. Actually, some twenty pilots and four radio operators were allocated to R.A.S. during the summer.

Next in importance must come the largely holiday services. Although both the mileage and tonnage figures are considerably reduced in the winter months, some of these companies do sufficiently well between April and September for the year's figures to be extremely good. These, in fact, are the only companies which, at present, are not only paying their way, but making a profit. The holiday, or semi-holiday, service is the advance guard of fly-by-itself air transport in this country.

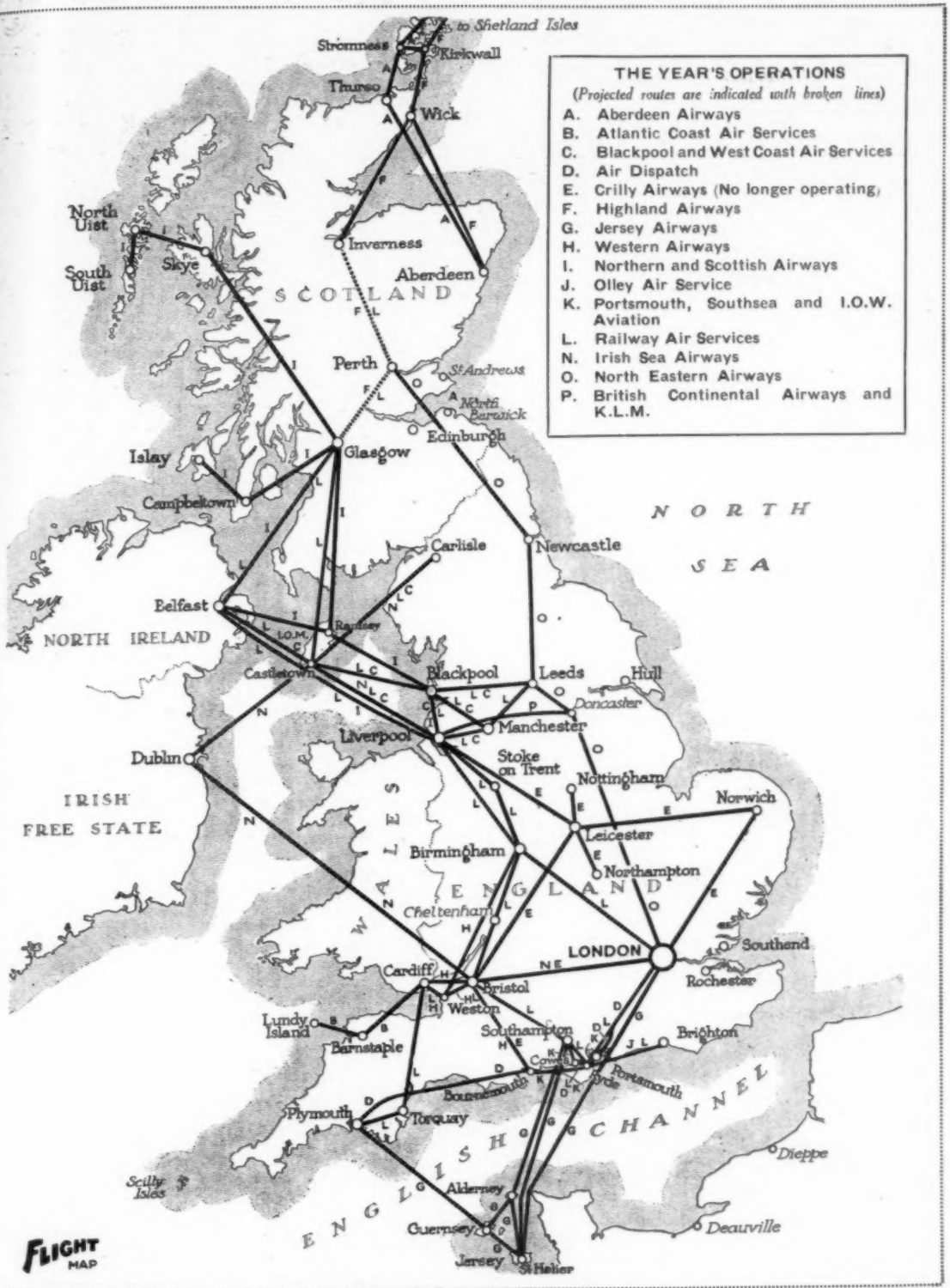
Jersey Airways, a company which started operations in a small way at the close of 1933, has once again been carrying record loads with a fleet of six D.H.86s, two D.H.89s, and one of the original D.H.84s. Since the Jersey airport is not ready, the beach at St. Helier is still being used, and this fact causes the company's operations to be somewhat unique. Only two daily services can be run in the normal way, and the result is that as many as eight machines are flown over more or less together at the rush periods. Jersey now has its radio D/F station, and this should have been of considerable assistance to the pilots during 1936. Incidentally, of 792 flights scheduled between Heston and Jersey in the first nine months of the year, only two were cancelled owing to fog. Absolute regularity was recorded on the Southampton-Jersey service—and this with the tidal difficulties which do not permit of service delays. The Plymouth-Jersey service is still by way of being an experiment, and was operated twice weekly during the summer.

This year Alderney has been an "on demand" stopping place, and when Guernsey's airport is ready the inter-island circuit will probably be reopened. It will be remembered that the amphibian previously used for this service was unfortunately lost at sea this year, causing the only passenger fatalities since the company started.

First to use the real possibilities of an Isle of Man service, Blackpool and West Coast Air Services (now an Olley offshoot) have increased and improved their fleet during the year, and appear to be holding their own with all competitors. Starting in a very small way (using Fox Moths over sixty miles of open sea!), the fleet now consists of two D.H.86 and three D.H.84 machines operating over five routes, not including the northern section of the service to Dublin, which they share with Aer Lingus Teoranta under the name of Irish Sea Airways.

In midsummer Mr. Norman Edgar moved his headquarters to Weston-super-Mare after carrying on modestly but fairly satisfactorily at Whitchurch since 1932, and

INTERNAL AIR ROUTES of 1936



While we still await the findings of the Maybury Committee, this is how Great Britain's internal air line map has actually developed without a co-ordinating plan. The only major changes since the spring are the appearance of a direct route to the North and of a Dublin service.

immediately experienced an extraordinary increase in traffic, some figures for which were given in *Flight* of August 20. In four and a half months of operation over the Weston-Cardiff route nearly 13,000 passengers have been carried out of a total of 16,907 for all services.

Although this ferry route is very short, the saving in time is extraordinarily great, while the cost of travel by air is little in excess of that of surface transport. During the summer a dozen return services were operated every day, and for the winter five services are being run. Since the boat service is not continued in the winter, the traveller can choose between a train journey of two or three hours at a cost of 11s. 2d., or an air journey of ten minutes at a cost of 9s. 6d. Many thousands of passengers will continue to patronise Western Airways ferry service as a form of good-value joy-ride; but the joy-rider becomes the confirmed air traveller when time and money can be saved.

During the summer a Birmingham-Weston service was opened, once again bringing the industrial district to the sea, and next year this service will be started much earlier in the season. At present the company uses four D.H.84s with two Puss Moths for supplementary work. Five pilots are employed.

Solent Ferry

Another pioneer ferry company—Portsmouth, Southsea and Isle of Wight Aviation—is now indirectly connected with Western Airways, inasmuch as they have leased part of the hangar at Weston and hold exclusive aircraft maintenance rights there, besides maintaining the W.A. fleet. During the year ending September 30, P.S.I.O.W.A. carried 30,682 passengers and 18,004 lb. of freight—mainly over the Portsmouth-Ryde ferry service. What is more interesting, the average load factor has been 55.2 per cent. over all services, and 57.5 per cent. on the Ryde service (representing a revenue of 4.6d. per passenger-mile). The latter has been scheduled twenty-six times daily during the summer months. The winter services allow for a daily schedule of nineteen return trips. The company now owns five Airspeed Couriers, and six pilots were employed during the peak periods, when more machines were also hired. During next season the principal London trains will be met at the Portsmouth stations. Naturally enough, traffic drops off during the winter, but the company is kept busy with maintenance and overhaul work. Ryde Airport, which is owned by an associated company, saw more than 47,000 passengers during the year, and on the busiest day 156 landings and take-offs were made by four companies.

Both Highland Airways and Northern and Scottish Airways are now associated with the British Airways' group. With the opening of the Shetland radio station, the former extended their mail service to Lerwick during the summer, and are also due to open a branch from Inverness, their operational base, to Perth and Renfrew. The latter have been running regularly to Skye, North and South Uist and to Islay, apart from the Isle of Man and Belfast. Once again we have services here which are a very definite advantage to the community in general.

In the North, too, Aberdeen Airways have extended their routes to Shetland, though the Edinburgh service has been treated as an "on demand" affair. The projected extension to Hull, planned two years ago, is still in abeyance. This company owns two D.H.84s, a D.H.89, and a Short Scion, with a D.H. Puss Moth for charter work. Next year we should see a North Sea service to Norway.

Of other internal over-water services Channel Air Ferries, an offshoot of Olley Air Service, ran between Brighton and Ryde. "Olleys," of course, is primarily a charter organisation, though a summer service was again operated to Deauville this year. The fleet for all purposes consists of three D.H.89s, a D.H.84, an Airspeed Envoy, a Short Scion, a Leopard, and two Fox Moths.

Atlantic Coast Air Services have been doing very much better this year with the Lundy Island service, nearly twice as many passengers being carried, though the Cardiff extension has not been very productive. As in many other cases, the poor traffic on this route can be partially attributed to the lack of booking facilities for the independent companies—a handicap to which *Flight* has alluded on a number of occasions, notably in the issue of July 23. This company uses a Short Scion and a Monospar S.T.4.

For a very long time the possibilities of a Dublin-London service have been considered by various people, and this year an Irish company, Aer Lingus Teoranta, was formed to operate a service between the Irish Free State and this country with the co-operation of Blackpool and West Coast Air Services. At first A.L.T. ran between Dublin (Baldonnel) and Bristol (Whitchurch), passengers proceeding by train to their ultimate destinations in this country, and B.W.C.A.S. ran between Baldonnel, the Isle of Man, and Liverpool. Later in the year the Bristol service was extended to London, and this section will be operated throughout the winter. The Irish company owns a D.H.86A and a D.H.84.

Direct to the North

By the time this article appears, North-Eastern Airways will have restarted their Northern service between Croydon, Leeds, Newcastle, and Perth, with a stop, when requested, at Doncaster. For the winter, at least, this will be operated northwards on Monday, Wednesday, and Friday, and southwards on the alternate weekdays. Airspeed Envoys are used. Air Dispatch, of Croydon, are now running a service from Croydon to Portsmouth, Bournemouth, and Plymouth, providing a link with the W.E.A. services. With the help of the Air Dispatch Paris service it will be possible for passengers to travel from Perth to Paris in a matter of five hours.

Although hardly an internal air line, the Liverpool-Doncaster-Amsterdam service, operated this year by British Continental Airways and K.L.M., should be mentioned, since passengers can be booked between the two English centres. Traffic is slowly developing on this service.

In spite of the many difficulties involved in this business of internal airline operation, it would seem that no one is discouraged, and the route map is becoming almost standardised. Whether it is standardised in a really rational form remains to be seen. The subject of internal airline operation generally is discussed in a leading article on page 453.

Paying for itself: The fleet of Jersey Airways on the beach at St. Helier.

PRODUCTION

Government White Paper Reviewed: The Expansion Programmes of 1935 and 1936: The "Shadow Scheme"

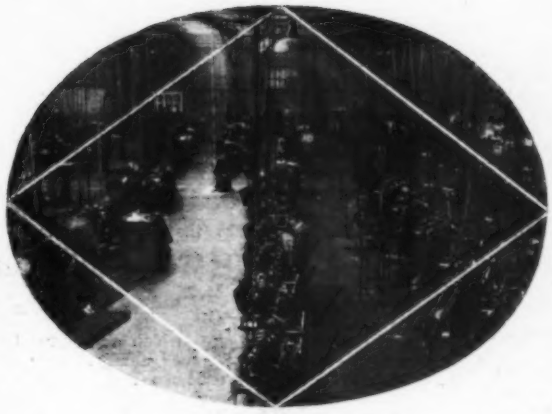
ONE useful purpose has been served by the otherwise unfortunate publication of the differences of opinion between Lord Nuffield and the Air Ministry: The light of day has been thrown upon the basic principles upon which the R.A.F. expansion and the so-called "Shadow Scheme" were founded, and the whole matter is now to be discussed by Parliament. The Government's reply, in the form of a White Paper (Command 5295), is frank and to the point, and shows no traces of any desire to hide behind the "not in the public interest that this should be disclosed" excuse which has so often been used in the past as a convenient smoke screen. No one would claim that there are no difficulties in the way, nor that with the policy outlined in the White Paper the expansion and the (in many ways) more difficult "Shadow Scheme" can be expected to be carried through without a single hitch. That would be too much to expect. But what does emerge is that the firms directly concerned have discussed the problems very thoroughly with the Air Ministry and have jointly come to the conclusion that the policy adopted provides a workable basis.

With the part of the White Paper which sets out Lord Nuffield's negotiations with the Air Ministry it is not proposed to deal here. This has already been given full publicity in the daily Press, and from the fact that Lord Nuffield has been promised other work of national importance one may assume that that hatchet is now buried. Of far more importance is the greater issue of supplies generally. To understand correctly the present position it is necessary to trace briefly the history from the beginning. Fortunately, the White Paper sets this out quite concisely.

Expansion

It is not generally realised that two expansion programmes have been initiated, the first in 1935 and the second this year. The first was presented to Parliament in July, 1935, in the form of a Supplementary Estimate which covered the initial expenditure in connection with the expansion of the R.A.F. The second was announced in a Statement relating to Defence, and was dated March 3, 1936 (Command 5107). This envisaged not only a further increase in the *first-line strength* of the R.A.F., but the building up of further large *reserves* of aircraft and engines. So large was this programme that it was obvious that it could not be undertaken by the existing firms unless these firms greatly expanded their capacity. The White Paper points out that two courses were open to the Government: It could give assistance to existing firms in making very large extensions, or it could try to bring in firms from outside the existing aircraft industry. Two points made in the White Paper are worthy of note. One is that the type of engine required to be produced in large quantities was largely governed by the types of aircraft selected as the most suitable for the R.A.F. expansion. In other words, the aircraft designers rather than the Air Ministry were responsible for choosing the engine types. The second point is that, as the White Paper points out, if these engines had been urgently required for first-line aircraft under the programme, the simplest and quickest course would have been to arrange with the engine company whose types had been selected by the aircraft companies to build a new factory which could deliver the requisite number of engines. The company concerned happened to be the Bristol Aeroplane Co., Ltd., whose Mercury and Pegasus types were, presumably, selected by the greatest number of aircraft designers.

The Government, however, did not feel that these engines were all required for immediate use, but that the reserve to be built up would need very large numbers—in fact, too large numbers to make it practicable for any one firm to undertake the production. It was this decision which led the Government to introduce what has now become known as the "Shadow Scheme." Previously the Committee of Imperial Defence had reviewed civil industry and had prepared plans by which a number of firms in civil industry were to be earmarked for particular types of war production, naval, military and air, and work common to all three services.



Concluding that the building, equipment, and management of a series of "shadow factories" on behalf of the Government would serve the dual purpose of giving the firms concerned valuable experience and at the same time help to increase the number of airframes and engines required by the programme, the necessary steps were taken to consult a number of motor manufacturing firms. The following firms had been allocated to the Air Ministry by the Committee for Imperial Defence: The Austin Motor Co., Ltd.; the Daimler Co., Ltd.; Rootes Securities, Ltd.; the Rover Co., Ltd.; Singer and Co., Ltd.; the Standard Motor Co., Ltd.; and Wolseley Motors, Ltd. (Incidentally, Morris Motors, Ltd., were allocated to the War Office and not to the Air Ministry.)

The Inauguration

On April 7, 1936, the White Paper states, the Secretary of State for Air (Lord Swinton), Lord Weir, and members of the Air Ministry met representatives of these seven firms and explained the scheme. The firms were asked to assist in securing the production of a given number of Bristol engines and to utilise this opportunity to the best advantage as an education for the role which they might be called upon to play in time of war. The firms were asked to consider, in consultation with the Bristol Company, what was, in their opinion, the most practical way of carrying out the scheme, bearing in mind, first, the importance of obtaining delivery of the engines within a stipulated time, and, secondly, the desirability of giving the firms the experience which they would require for production of aero engines in the event of war.

The firms agreed to co-operate with the Air Ministry as a team, and a committee was formed, under the chairmanship of Sir Herbert (now Lord) Austin, there and then, i.e., on April 7.

Bits and Pieces

On April 21 the Secretary of the Committee reported to the Air Ministry that the Committee had now discussed among themselves and with the Bristol Company the best means of carrying out the programme envisaged, and that they were of the opinion that each of the shadow factories set up should undertake the manufacture of a different group of parts of aero engines, and that the assembly and test of the complete units should be undertaken by two factories only.

The White Paper indicates clearly that the Air Ministry itself had some doubts in the matter. "The Air Ministry," the White Paper states, "would have preferred that each engine should not have been sub-divided among as many as seven firms. A meeting was in consequence arranged with Sir Herbert Austin as chairman of the Committee on the 30th April, who undertook that the matter should be further considered by the Committee." After considering the matter again the Committee informed the Air Ministry, on May 7, that the Committee was definitely and unanimously of opinion that the safe and practical scheme was for each firm to manufacture one section only.

"In arriving at this conclusion," the White Paper comments, "the firms were greatly impressed by the difficulty and

delay which would arise under any scheme which involved the duplication or multiplication of orders for jigs, fixtures, gauges, tools, and other plant. They also took into consideration the increased strain of supervision which would be placed upon the Bristol Company if the making of the same sections were undertaken by a number of firms." The White Paper then goes on to explain why Lord Nuffield's offer to build 2,000 complete Bristol engines was turned down by the Air Ministry. The reason was the quite logical one that Lord Nuffield's proposal was inconsistent with the policy proposed by the Committee, which the Air Ministry had agreed to adopt.

However, to make absolutely sure that he had understood the views of the firms correctly, the Secretary of State for Air arranged (on June 29) yet another conference, at which Sir Herbert Austin reaffirmed that the Committee adhered to the original view that the seven-firm scheme was the best. He, personally, would have preferred, in the interests of his own firm, to make complete engines, but such a course would not have secured the objects in view.

The concluding part of the White Paper deals with the interviews which took place between representatives of the Air Ministry and of Lord Nuffield's companies, and indicates that the final refusal by Lord Nuffield's interests was based upon an internal reorganisation. The place of Wolseley Motors in the scheme was then taken by the Bristol Company.

THE AIR LEAGUE'S PROGRESS

THE Air League of the British Empire—which was founded as far back as 1909—has recently issued a report on its activities during the past few years. It sums these up as follows:—

"To guide public opinion and secure its understanding of the country's needs the Air League has:—

(a) Given over 450 lectures, and written hundreds of letters and articles to the Press.
(b) Loaned 4,000 lantern slides.
(c) Organised Empire Air Day—the one day of the year on which aviation and the public shake hands. (Empire Air Day has raised £14,000 for aviation charities in three years.)
(d) Organised aviation sections at many exhibitions.
(e) Introduced a junior section, which now has a 4,000 membership.
(f) Published a magazine which is sent free to members.

To encourage private flying the Air League has:—

(a) Introduced the Young Pilots' Fund, under which nearly 200 young men have been helped in learning to fly. (£10,000 has been brought into aviation by the Fund.)
(b) Popularised the home construction of aeroplanes and proved the demand for ultra-light and cheap types.

To encourage air travel the Air League has introduced an insurance scheme under which its members are insured, free of cost, for £1,000 when travelling on British air lines.

Information as to membership, etc., may be obtained from the League at 19, Berkeley Street, London, W.1.

AN EMPIRE AIRWAY FILM

OVER 30,000 miles will be flown by a Strand Film Company unit which is leaving Croydon next week to produce a group of films about scenes and people along the air routes of the Empire.

The subjects will include the new Empire flying boats, radio communication in the tropics, the organisation lying behind the air routes and the "all mail by air" scheme which comes into force in the new year.

One of the films will show a typical day in the life of a Colonial airways station superintendent at a distant airport; another will deal with the training of airline crews. Imperial Airways are giving full co-operation and facilities for the whole series.

Alexander Shaw, the director of the successful book film, "Cover to Cover," is in charge of the unit, which will be away for over four months. For the main feature film of the group, "The Future's in the Air," special facilities have been obtained for filming in Australia, Sumatra, Bali, Hong Kong, Egypt, Malaya, and along the Persian Gulf.

The films, which are being produced under the supervision of the documentary film expert, Paul Rotha, who was responsible for the air film "Contact," mark a new step in the Strand Film Company's productions dealing with transport and communication. Many who have seen the excellent efforts produced in the States on behalf of Pan-American Airways have felt that a British equivalent was long overdue.

Heston's De-mousing Plant

"*JOB No. 426 A, Avian:* (1) *Replace front instrument board.* (2) *Clean down flying wires and oil (linseed oil).* (3) *Clear out all* MICE *definitely and completely.*"

This job-ticket, it seems, is causing considerable uneasiness among those in charge of maintenance work in the Airwork service department at Heston.

Clause 3 (remarks *Heston Flying News*) is fraught with difficulties. You can put a cat into an Avro Avian (one was, in fact, discovered in this type of aeroplane while *en route* for Amsterdam—an occurrence upon which the present case throws new light), but you cannot scale her down to dimensions suitable for pursuing her quarry along the inside of the wing and devouring it in the pitot tube or whatever constricted spot it may have fled to.

A ferret is aerodynamically better adapted to the job, but nobody who has ever clasped one to his bosom in the course of a rat-hunt will ever willingly introduce its distinctive aroma or "bouquet" into a private aeroplane. Then there is poison, an unsporting alternative which, however, carries certain definite risks. The mice will recognise it as alien to their usual diet of spruce and soundproofing and probably ignore it with a cold disdain; and any of them which are fool enough to eat it will almost certainly crawl out and die in someone else's aeroplane, which raises visions of claims and compensations too horrible to contemplate.

So the Airwork service department has plumped for mouse-traps, and baited them with a Stilton which recently left the restaurant under its own power, and of which great things are expected.

FLIGHT
THE AIRCRAFT ENGINEER AND AIRSHIPS

NEXT THURSDAY

NEXT week's issue of "FLIGHT," dated November 12, will be of outstanding interest and utility. It is the annual special

BRITISH AIRCRAFT INDUSTRY NUMBER

the contents of which will include a complete review of the products of more than thirty firms manufacturing civil and military aircraft.

There will also be a review of modern British aero engines and a survey of the accessory and component field.

The data given, and the many illustrations, will make this issue of *Flight* exceptionally valuable to all interested in the progress of aviation.

A regular order for "Flight" should be placed with newsagents.

SAN PEDRO SPECTACLE : Destroyers and flying boats of the U.S. Navy rehearsing off San Pedro for Navy Day, held on October 27. The archaic marine aircraft in the foreground is a P.N. type, but, flying lower and farther along the line, is a Consolidated P2Y-1, which has retractable wing-tip floats and a veiled performance sheet.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

THE French Government has earmarked £50,000,000 for the expansion of the Air Force.

Lord Beaverbrook has ordered a Lockheed "12" monoplane with a maximum speed of nearly 230 m.p.h.

"The Great Engineering Fair and Building Fair," two sections of the 1937 International Leipzig Spring Fair, will be open from February 28 to March 4.

A Koolhoven single-seater fighter with a Lorraine Petrel engine driving two airscrews, Macchi fashion, will be shown at Paris next week. It is claimed to do 323 m.p.h.

Mr. Joly de Lotbinière, the B.B.C. outside broadcast director, has arranged to broadcast first-hand an account of a novice's sensations on gliding for the first time. The transmission will be in the National programme on November 14.

The prize money for the New York-Paris air race next May has been increased to £33,000. It is reported that there will be at least three official entries from the French Air Ministry, including a machine to be flown by Codos and Rossi.

Apparatus which "listens" to the beating of a pilot's heart while he is in the air and transmits a record of it to the ground, where it can be reproduced on a sound film, has been designed by scientific workers of the medical aviation department of the Soviet Civil Air Fleet.

One of the Tiger-engined Blackburn Shark seaplanes supplied to Portugal some months ago was the vehicle employed to convey to England the reply of the Portuguese Government to complaints lodged by Madrid and Moscow about the alleged supply of arms by Portugal to the Nationalists in Spain. The machine landed at Portsmouth.

ONE OF THE LADS: A familiar overalled figure at Hanworth these days is the Baroness Rudoleine von Simolin, 17-year-old daughter of one of Germany's biggest chemical manufacturers. She is now serving a hard-working apprenticeship at the Kronfeld factory at Hanworth, and is seen here in front of the Carden-engined Drone.

De Havillands are producing for the Air Ministry a training monoplane with one of the new D.H. Gipsy Twelve air-cooled engines.

The Gipsy Twelve, incidentally, is developing over 500 h.p. It is arranged as an inverted vee-twelve and is understood to be a geared and supercharged model.

Parnalls have designed a military general-purpose development of the Heck. It is estimated to do 199 m.p.h. with a Wolseley Scorpio II.

Mr. Stephen Appleby is selling his veteran *Pou du Ciel*, which has flown 65 hours in the hands of eighteen different pilots, and has bought M. Henri Mignet's "Interceptor" model.

The Duke of York referred to the co-operation between aircraft manufacturers and the shipbuilding industry at the Livery dinner at the Mansion House on Monday.

Twenty-five Years Ago

(From "Flight" of November 4, 1911.)

"In conclusion, the Government fully recognise the immense importance of aerial scouting in war. It has passed beyond conjecture now as to whether aeroplanes can or cannot ascend in all reasonable weathers and observe large numbers of troops. Further, it is vital for any country that has an army to have an aeroplane survey. Both the War Office and the Admiralty have realised the importance of these things, and are working together to provide a really efficient scouting service."

Private Flying

Topics of the Day

Cheaper Engines

IF there is much more of this car-engined aeroplane business some people will begin to think that our aero engine manufacturers have let us down. Nobody would have thought of fitting either converted or unconverted car engines to light aeroplanes if the real aero engine had not always been the most disproportionately expensive part of the machine.

I am not going to suggest for a moment that the manufacturers have been profiteering, since they, and they only, know how much development work expenditure has had to be added to the price of production engines, and I would rather pay another £100 or so for mental comfort. One is making a poor bargain in saving even that much money at the risk of one's life.

Nevertheless, if cost can be reduced at the expense of extra weight rather than of reduced reliability, then the owner is merely paying less for a machine with either a reduced payload or a reduced performance. The decision involved is a simple one. I should prefer to learn that one of these converted car engines had done a successful hundred-hour full-throttle test, and had been stripped in a satisfactory state before I, as a prospective owner, flourished a cheque book.

True Comparisons

EVEN if such a test was passed, we should still have no right to laugh at the aero engine manufacturers. The converted engine will be cheaper only because we are taking advantage of quantity production; without the car sales there would be no engines to use. If an aero engine manufacturer could sell even five thousand motors every year the price would come down towards car engine level.

However, let us give full marks to the Ford organisation for producing not only excellent cars at a very low price, but also power units which, so far, have been the only ones to be used by aeroplane designers. One might imagine that they are being made unnecessarily light in weight for road use, but, since they appear to be reliable enough, that is nothing to grumble about. Curiously enough, the Vee-eight delivers its maximum power at the sort of speed reached by the majority of modern geared engines, so that a normal type of reduction gear can be used.

Talking of low weight, it should not be forgotten that even the Ford engine has a very poor power-weight radio in comparison with any real aero engine. Neither the Arrow monoplane in America, nor the Wicko cabin monoplane in this country, has anything very startling in the way of a payload. A few years ago the fact that they flew at all might have been considered as one worthy of special celebrations—once we had conveniently forgotten that pilots sometimes flew with much less efficient car engines in 1909.

Using the Daylight

FOR the moment, at any rate, the private owner or hirer of aeroplanes cannot fly at night, and even the internal airline operator is not yet provided with the ground equipment which will permit him to run services after dark. This being so, one would imagine that the air travellers' day might be arranged a little more logically than that of the normal citizen.

The latter usually emerges from his bed at 8 a.m., and returns thereto at 11 p.m. Daylight, at this time of the year, begins at 6.30 a.m. and ends at 5 p.m. or before. The pilot, therefore, living as part of the normal community, loses three good hours of daylight.

Admittedly, those three morning hours are sometimes washed out by the prevalence of fog, and if we are going to use them at all we must either wheel our own aeroplanes out and run them up, or change the habits of the whole community by our own good example! Hard-worked instructors and ground engineers would throw me into the local duck-pond if I suggested that winter club flying might start at 8.30 or 9 a.m. instead of 10 a.m.—it is usually 10.30 a.m. before a machine is really available.

Even in summer there is something to be said for an early start, since the majority of club pupils cannot, at present, do any flying until the evening on a normal week-day—and is often at his worst after a day's work.

Night Flying

THE majority of non-pilots imagine that, sooner or later, private owners will be flying as readily by night as by day. Personally, I doubt it, unless there are very big changes in the very principle of the kind of aeroplane used, and even then it is natural to suppose that transport machines will, in due course, be flying as consistently by night as by day, which means that the private owner will need to carry radio, and will be as strictly controlled as everyone else. He won't like that.

Anyone who has flown in bad weather by night as pilot or second pilot on a transport service should remember enough about his experiences to be able to imagine himself flying in the same conditions with a single engine, no radio, and considerable trepidation. Nothing would induce me to fly by night in such conditions with no equipment—quite apart from any difficulty in inducing the Air Ministry to permit me to do so at the risk of collision with far more important machines. The general procedure for pilots flying in Q.B.I. conditions is too complicated for the amateur to be expected to carry out, even if he can afford the necessary equipment. Meanwhile, we still have amateurs and others "trying to find Croydon" without, apparently, giving a moment's thought to the safety of transport passengers.

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

READING

CONGRATULATIONS to Mr. and Mrs. Powis on the birth of a son and heir at 27, Wimpole Street, on October 28. During the course of the week Mr. Holmes went solo and Mr. Masterman became a pupil. The flying time was 29 hours.

DONCASTER

Club machines flew 30 hr. 40 min. during the month ended October 31. New members were Mrs. S. Reyner, Mrs. T. E. Morris and Messrs. V. Hann-Smith and T. E. Morris.

C. A. S. C.

Members flew 8 hr. 30 min. on Sunday. Messrs. L. C. and L. M. Kemp and T. W. H. Burton have joined the Corps and Mr. H. P. Dunn has made a trial flight to qualify for probationary membership.

CAMBRIDGE

Flying times at Marshall's Flying School for the week ended November 1 totalled 55 hr. 15 min. Mr. Hood completed his first solo and "A" licence tests. Messrs. Oughton, Culla, Burton, Arprino, Charters and Sisson have joined the School. No flying was possible on the 27th.

LONDON

Very high winds curtailed last week's flying total, the final figure being 41 hr. 40 min. Miss M. J. King and Mrs. P. W. Rowley went solo. New members were Misses B. Cooper, M. G. Braden, A. Bailey, A. Stafford, Messrs. O. Steenfeldt, A. O. Cundy, L. R. Courtney, E. Earnshaw, R. H. Sandeman, J. H. Wingate-Hill, J. Winning, H. Clement Davies, Neville Clarke, E. C. Prentice, and Dr. A. Gugenheimer.

HANWORTH

The Aeroncas are meeting with great popularity among the licensed Club members. Instruction on this type is expected to begin very shortly. Mr. C. D. C. Williams has become an instructor at the Club. He is an ex-R.A.F. pilot and has spent several years in India. Three non-flying days last week resulted in the comparatively low total of 44 hr. 5 min. for the seven days. Mr. J. A. Stone and Mr. S. Smith (National League of Airmen) became members.

SOUTHEND

Over two hundred members and their friends attended the annual supper ball held on October 28. The Mayor of Southend-on-Sea was present, together with Mr. Leslie Irvin, who flew in with his wife, and Mr. and Mrs. Brian Allen in a Stinson. Mr. Davis flew up from Lympne with a party of eight. It is hoped to hold another dance before the end of the season. Gales and rain handicapped flying during the week, but on Sunday all machines were working to capacity until dusk. Two members renewed their licences and Miss Squires and Mr. Seabrook became members.

MALLING

The flying time for October was 107 hr. 30 min. There were seven new flying members and, to everyone's satisfaction, Mr. W. L. Woodward returned as instructor. Mr. H. G. Hubbard went solo, and together with Mr. H. Dade passed the "A" licence test. Mr. E. Lewis, who had not flown since the War, also went solo after fifty minutes of rather superfluous dual. Mr. G. Goodhew, the ground engineer, took his pilot's "B" licence. A demonstration of the Monospar ambulance and S.T.25 was given by General Aircraft and several members availed themselves of the opportunity of flying these types.

LYMPNE

The weather brought the flying total for the week ended October 31 down to 31 hours, including 1½ hours night flying. Mr. Merrick Hymans passed the tests for an instructor's licence and Mr. Chalmers completed his "B" licence tests at Hendon. Mr. McCartney did his cross-country and night flights, thus finishing off his "B" licence tests, and his next move will be to take an instructor's licence. High wind prevented Mr. Griffiths making his first solo. Mr. Bridger, having completed 100 hours' solo, is getting down to serious training for his "B" licence, and Mr. Tom Hackney has decided to go ahead with his "B" with a view to carrying on to instructor's standard. Mr. Hilditch has also decided to take an instructor's licence with the Club. Mr. Speir, who took his "A" licence at Lympne in 1932 and purchased his own machine, has left the army in favour of a flying career and will shortly be in training at Lympne. "The Tonies"—Messrs. du Port and Morris—have returned from Scotland to take up their duties once more, and the lecture room is again populated by a studious crowd.

NORFOLK AND NORWICH

Messrs. J. Edge and W. J. Jamieson have passed their "A" licence tests. The annual ball will be held at the Lido Ballroom on Friday.

YAPTON

Considering the frequency of high winds, the flying time for October (87 hr. 40 min.) was satisfactory. Mr. R. Alington went solo and, together with Mr. E. G. Mortimer, passed the "A" licence tests.

MADRAS

The Rajah of Viziamagram's Avro Commodore arrived on its second visit to India. Mr. Davis, of the Gloucester Regiment, went solo after 3 hr. 40 min. dual. The flying time for September was 106 hr. 50 min.

KENT

Twenty hours' flying was logged during the last week in October. Mr. Parkin passed his "A" licence tests and Dr. Hyslop became a flying member. Mr. Klein, who took his "B" licence at the Club and has been piloting for the "Flying Parson" during the summer, is taking an instructor's course.

BORDER

Staff holidays and extremely bad weather have curtailed flying activities very considerably. The wind became so strong as to exhaust the supply of wind socks. The recent aerodrome drainage stood up well to the heavy rainfall in view of the fact that most of the surrounding country was flooded on several occasions. Messrs. Voigt and Braithwaite have become members.

REDHILL

For the week ended October 30 the flying times amounted to 62 hours, bringing the total for October up to 253 hr. 25 min. Two members, Sir Alastair McRobert and Mr. L. E. Clarke, set off on trans-Continental flights in their own machines, the former to India and the latter to New Zealand. The Club Autogiro is in commission once more and available for dual instruction. There were five new members last week.

LONDON GLIDING

Soaring conditions at Dunstable during the past fortnight were good and flying took place on ten days out of the fourteen. Flying times totalled 77 hr. 32 min., and one "A," two "B" and four "C" certificate tests were made by members. On Sunday, October 18, Club members put in 32 hours' flying, and on the 25th, 28 hours. On the 25th three members, Messrs. Fox (Kirby Kite), Rattray (Cambridge), and Davis (Scudd II) made cross-country flights, the longest being by Mr. Davis with approximately fifty miles. Captain Rattray reached 5,000 feet during a trip to Hatfield.

NORTHAMPTONSHIRE

The total flying time for October was well above that for any month since the Club reopened in June, although many hours were lost owing to weather. Some 20-odd pupils are under instruction at the moment. Mrs. Tyzack, who was recently married to one of the Club's oldest flying members, Mr. Peregrine Tyzack, is following in the footsteps of her husband and sister-in-law. Capt. Sir Peter Grant-Lawson, Bt., and Mr. A. J. Spiller have qualified for their "A" licences, while Mr. R. Eyton-Williams and Mr. Louis Wood have gone solo. Over 100 members and friends attended a very successful Club dance on October 23.

CROYDON

Club machines spent 35 hr. 15 min. in the air last week. Two pupils, Messrs. T. D. Low and A. E. Low, have been receiving dual instruction on the Dragonfly. The Puss Moth has been away for a week on special charter. Capt. S. F. Woods, the chief instructor, made a trip to St. Inglevert on Thursday with Mr. P. Hahn, one of the pupils. Owing to the heavy bookings and the absence of an instructor, it was necessary to call upon the services of Capt. A. L. Robinson to take a pupil. Sunday was a very busy day, and all the machines were kept in the air. New members include Messrs. P. Wolfe, P. Harrison and E. Williams.

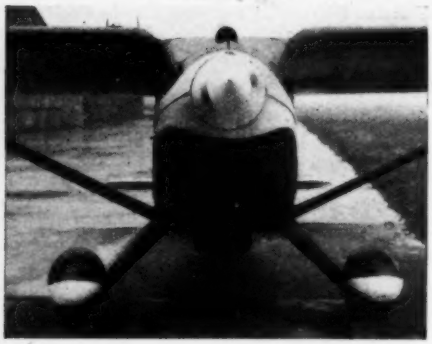
BROOKLANDS

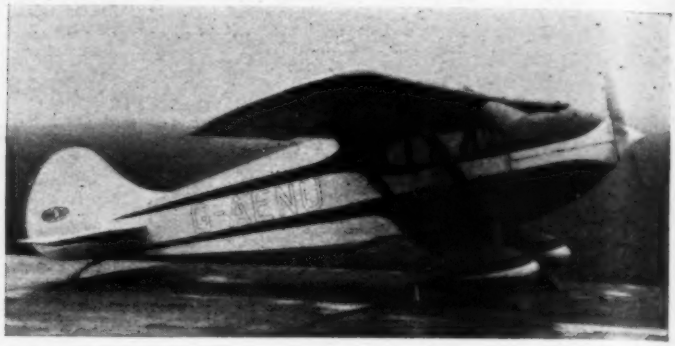
On Sunday, the 24th, the day following the calamitous fire, members and instructors arrived at Brooklands to find a state of complete chaos. Everyone set to with a will on the salvage and sorting out of everything from flying helmets to typewriters. By Monday morning office accommodation had been organised at Butts Lodge and The Shop, and by the end of the week telephones were ringing again and work continued as usual. In spite of the trials and tribulations, flying was in full swing on Sunday, but contrary winds and rain squalls kept last week's flying times down to 60 hours dual and 19 hours solo. Mr. Hely Hutchinson, who has done all his flying in the early hours of the morning, before going to the City, has gone solo. Mr. Pardoe has done his height test.

Private Flying

FORD-POWERED

The Wicko Monoplane Flies : A Cabin Two-seater with a Converted Ford V-8 Engine





Two views of the Ford-engined Wicko. That on the left gives a good indication of the clean lines, particularly of the cantilever undercarriage, while that on the right shows the general lines of the machine and the neat way in which the engine has been cowled. (*Flight* photographs.)

ORIGINALLY described in *Flight* of July 30 this year, the Wicko monoplane has been flying at Stapleford Abbots for several weeks. The machine is primarily interesting because it shows what can be done with an almost standard car engine, and secondarily because, by using such an engine, the price can be kept down to a very reasonable figure. How the Ford V-8 engine will stand up to this new work in its geared form, and whether owners will be prepared to sacrifice payload and range for a very considerable reduction in initial price, remains to be seen. A second machine will be fitted with a Cirrus Minor engine, and the price of this model will still be low enough to be attractive.

In its present form the Ford engine has been modified hardly at all, save for the arrangement of a double-helical spur reduction gear for the airscrew, and the mounting is rigid. In the future, rubber shock absorbers will be incorporated and there will be dual ignition, the twin plugs being fitted in Y-type adapters, which will be screwed into the normal plug orifices. A Gallay radiator is mounted beneath the fuselage with a header tank above the engine, the circulation being forced by dual pumps.

Undercarriage Simplicity

The machine itself is of very straightforward construction with a ply-covered fuselage and fabric-covered braced high wing of Clark YH section. The undercarriage is of engaging simplicity. Rigid cantilever legs are pivoted at the lower longerons, and inward extensions of these legs are held in a cradle of shock-cord.

Though arranged in the dash the throttle can comfortably be held in the pilot's left hand, while a second pilot, or instructor, could also reach it very easily. The side-by-side seats provide plenty of elbow room and each is adjustable. Naturally enough, the top of the engine cowling is high in comparison with that of modern inverted engines, but the somewhat restricted forward view is partially balanced by the excellent field of view at the side. In rain the pilot's window can be opened and held open by a catch on the lower surface of the wing.

When we visited Stapleford, visibility was a matter of half or three-quarters of a mile with a light rain and no appreciable wind. In such circumstances it would have been a dangerous waste of time to a newcomer to have attempted to take the Wicko up, but a member of the staff flew round with Mr. Wikner, the designer. Though knowing the district very well, even he got himself lost for a few minutes! The Ford engine gives something like 85 b.h.p. at 3,500 r.p.m., but, because, perhaps, of a slightly unsuitable airscrew, the engine on this occasion reached its maximum at 3,000 r.p.m.—at which the indicated air speed was 100 m.p.h. The fact that the engine was running too cool, after a modification to the radiator, may have had something to do with the lack of revolutions. With an almost full load the take-off was poor, about fifteen seconds elapsing between the moment of opening up and the final bounce off the rough surface. One up, the figure was nine seconds. In a breeze and with better air and surface conditions these figures should be considerably improved, but, for the use of the amateur pilot, we suggest it would be better to sacrifice a little of the performance and have more wing area. The indicated landing speed was just short of 50 m.p.h.

It is possible to make accurate turns on the rudder alone and we were told that the machine is very stable at the stall, though the weather conditions did not permit a safe demonstration of this. No tail-trimming gear is fitted and none, it appears, is needed, though a little motor during the final approach obviously relieves the load on the stick. The makers are: Foster, Wikner Aircraft Co., Ltd., Lusty's Works, Colin Street, Bromley-by-Bow, E.3.

THE WICKO MONOPLANE.
85 h.p. Ford or 80 h.p. Cirrus Minor engine.
Specification with Ford engine.

Span	31 ft. 6 in.
Length	22 ft. 3 in.
Power Loading	20 lb./h.p.
Wing Loading	12.5 lb./sq. ft.
All-up Weight	1,700 lb.
Pay Load	260 lb.
Maximum Speed	115 m.p.h.
Cruising Speed	100 m.p.h.
Landing Speed	50 m.p.h.
Range	250 miles
Price	£425

Edinburgh's Aerodrome

THE Edinburgh Council has recommended that the Gilmerton aerodrome site should be sold. An opportunity has arisen for this ground to be disposed of on terms which would recoup the Council for its outlays. There remains Macmerry!

However, all hope need not be lost since a wider survey had been made and a report will shortly be completed.

For Valour

NOBODY who took part in the mass landing of a hundred visiting aeroplanes in twenty-six minutes at Gatwick last June will deny that their hearts beat faster as they elbowed their way down in the eighty-mile-an-hour queue. So the presentation of inscribed tankards to the survivors (they all survived, which reflects great credit on everybody) is a gesture as appropriate as it was unexpected. A list of unclaimed tankards is on the Heston notice board, and Gatwick's graceful action has provoked much pleased comment among beneficiaries and onlookers alike.

Mr. James Mollison and (above) his racing Bellanca *The Dorothy*.

NEWFOUNDLAND to LONDON in 13¼ HOURS

Mr. J. A. Mollison's Notable Achievement and Ambitious Plans

MR. JAMES MOLLISON has certainly made an impressive start to his proposed three-fold flight. It was thought to be very ambitious when he announced that, taking off from New York, he would fly the North Atlantic *via* Newfoundland, and, after the smallest delay for servicing the Pratt and Whitney Twin Wasp Junior engine of his racing Bellanca, would take off again for the Cape, this to be followed by a flight to Australia! It is to be hoped that his landing at Croydon at 9.57 a.m. last Friday, 13 hours 17 minutes after leaving Harbour Grace, Newfoundland, is a start indicating how he means to go on.

There seems to have been no doubt as to the staying power of the Bellanca and its ability to average over 200 m.p.h. on the crossing. It was only 16 minutes late on estimated time of arrival. And in practice this flight developed into a test of the pilot's endurance at 15,000 ft. in the very bad weather conditions, which caused an hour's delay in mid-ocean while Mr. Mollison circled round in a clear and rather warmer patch to thaw ice on the wings. The coast-to-coast time of under ten hours, averaging about 220 m.p.h., is very creditable, and vividly brings home the "air-nearness" of the western continent. According to a note from a Newfoundland correspondent, kindly brought over for us by Mr. Mollison, the latter accurately foreshadowed ten hours as his coast-to-coast time.

The Dorothy, known to Bellancas by the type-name Flash, is none other than the *Irish Swoop*, the MacRobertson non-starter and one-time Australian record aspirant. Through the good offices of The Rollason Men, who tended it during those hectic Mildenhall days, and who were soon renewing their acquaintance at Croydon on Friday, we were able to look over it and note the modifications which have lately been made.

It appears that the wings have been strengthened up and that the inverted kingposts anchoring the lift wires have been shortened. These latter are now connected by a skid-like member, intended, some say, to give protection if the retractable wheels become temperamental. But, more likely, the whole affair would telescope up and penetrate the main tank.

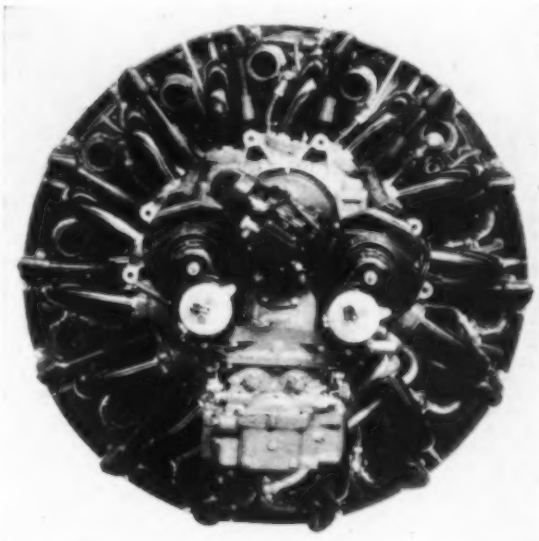
The engine is the same Pratt and Whitney Twin Wasp Junior two-row, fourteen-cylinder radial, supercharged to deliver 700 h.p. at 8,500 ft., and driving a two-position Hamilton airscrew.

Mollison flew from the front seat and had the cockpit roof off all the way over. Although there appears to be a system of cockpit heating he says he was cold.

One noticed that the small wooden distance pieces between the duplicated front flying wires had vibrated into the path of the retractable undercarriage, denting the well covers and splintering themselves.

The maximum speed is about 260 m.p.h. (the 272 m.p.h. mentioned a week or two ago seems a little optimistic) and the range over 3,000 miles.

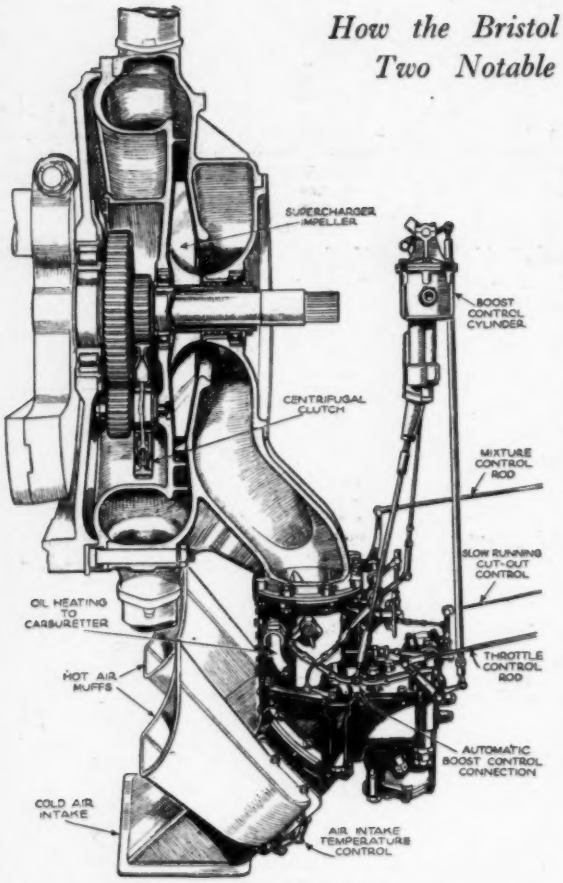
The Twin Wasp Junior used Shell fuel.



A near view of the 700 h.p. Pratt and Whitney Twin Wasp Junior. The even outline is due to the comprehensive system of baffles necessary to cool the engine when it is used in a low-drag cowling.

IMPROVING the BREED

How the Bristol Pegasus and Mercury were Developed: Two Notable British Engines Described in Detail



The layout of the supercharger drive, induction system and carburetter. The impeller of the supercharger is driven from the rear end of the crankshaft through a set of three planet gears, of which one is shown in the drawing. Note that in addition to the use of the hot-air intake, the carburetter body is oil-heated. The purpose of the automatic boost control is to prevent the pilot from giving the engine full supercharge until the rated height is reached. In the photograph on the right is the drive for the impeller.

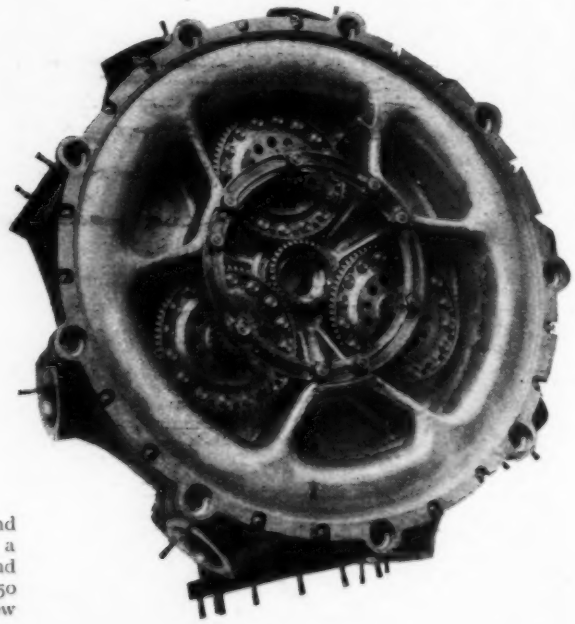
HE would have been a bold man indeed who would have ventured, some seventeen years ago, to prophesy that one day Mr. A. H. R. Fedden would be getting about 1,000 h.p. out of a nine-cylinder radial engine of the same capacity as the Cosmos Jupiter engine which Mr. Fedden had then just produced, and not differing in fundamental conception from it.

The designs for the Jupiter engine were accepted by the Government in July, 1918, and the first experimental engine was completed before the end of October the same year. This engine was fitted in a Bristol Badger. Developments followed, and by the end of 1919 the ungeared Jupiter developed 400 b.h.p. at 1,650 r.p.m., while a geared version with epicyclic airscrew reduction gear developed 450 b.h.p. at 1,850 r.p.m. Both engines had a bore of 5¾ in. and a stroke of 7½ in., and the weight of the direct-drive engine was 636 lb., while the geared version weighed 757 lb.

The real beginning of serious development and improvement was the taking over of Mr. Fedden and his chief technical assistant, Mr. Butler, by the Bristol Aeroplane Co., Ltd., as well as the drawings and designs from the Cosmos Engineering Company, which had started the work. The great resources of the Bristol company made it possible to spend the necessary capital on equipment. This happened in 1920, and since that time Mr. Fedden and those associated with him have never looked back. That they have encountered setbacks and difficulties goes without saying, but present-day Bristol aero engines have achieved a world-wide reputation for clever design and superb workmanship, a reputation which could have been established on nothing but sheer merit.

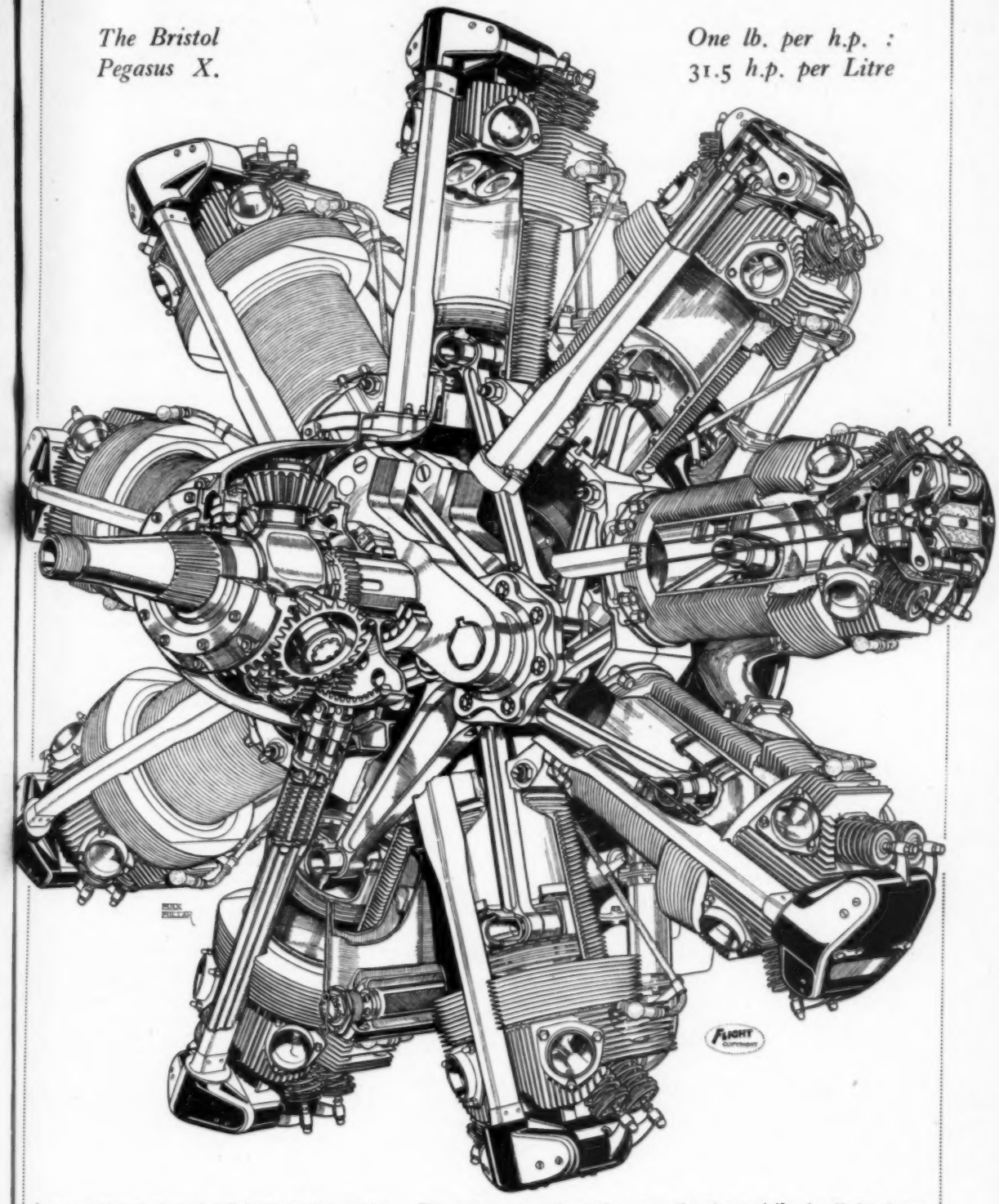
Visitors to the forthcoming Paris Aero Show will have an opportunity to see some of the latest Bristol engine types. For the benefit of others, this description and illustrations will, it is hoped, prove an acceptable substitute.

For the present, two main Bristol general types come into the picture, although these are again subdivided in accordance with variations in supercharging, airscrew gearing and similar features. These two types are the Pegasus and the Mercury. The former has been used extensively in both civil and military aircraft, and its applications are growing almost daily. The latter is regarded mainly as a military type, its smaller diameter making it particularly

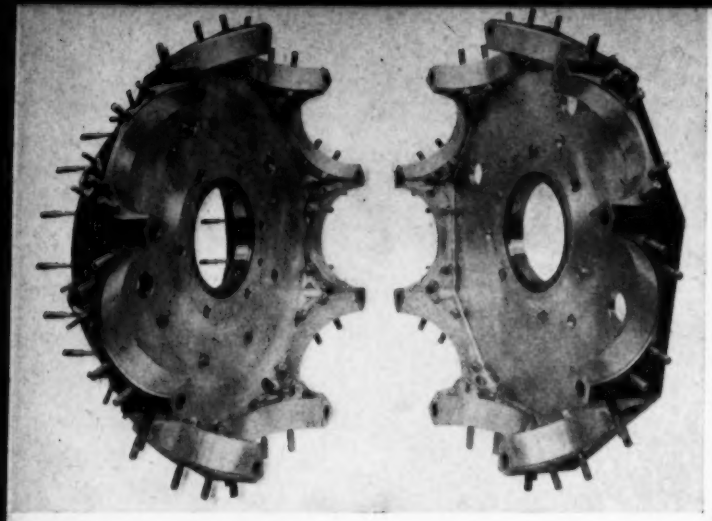


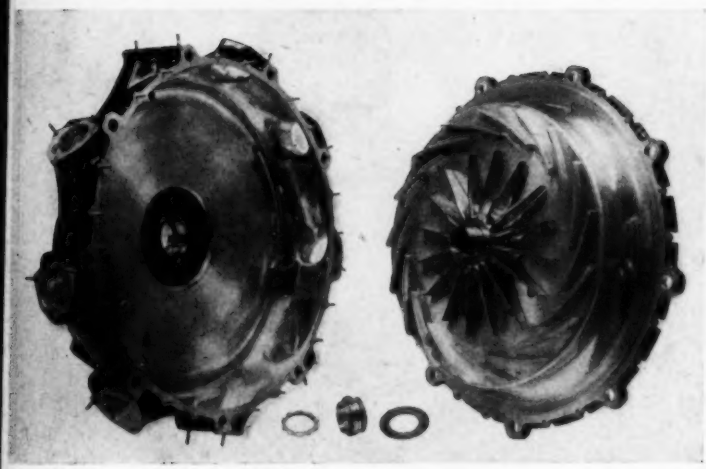
The Bristol Pegasus X.

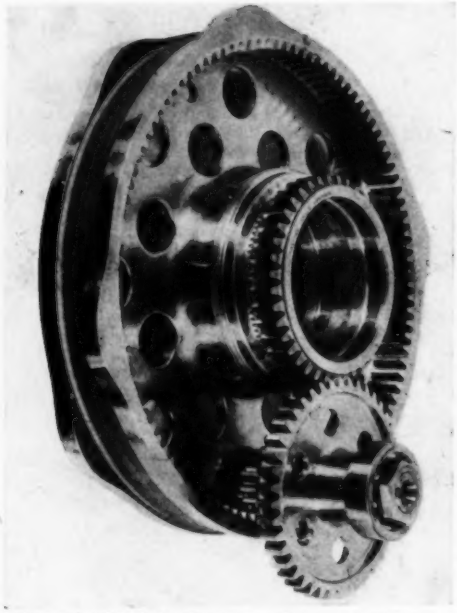
One lb. per h.p. : 31.5 h.p. per Litre



A part-sectioned view of a Bristol 900 h.p. engine. The master connecting-rod goes to the piston of No. 6 cylinder (lower left). The airscrew reduction gear is of the type having two crown wheels and three bevel pinions. The cam sleeve which operates the valves is located between the reduction gear and the crank throw. The rocker boxes on top of the cylinders pivot about two pillars, and the front end of the box is linked to the crank case by a tie-rod lying between the two push-rods. This compensation gear maintains correct valve clearances.







Some details of the Pegasus. The upper picture shows the two-piece crank case of forged aluminium, machined all over. In the centre, is the supercharger, which has an aluminium alloy blower casing and a magnesium alloy volute casing. The lower photograph shows the cam sleeve drive, which gives an 8 : 1 reduction in relation to the crankshaft.

suitable for fighters and other fast aircraft. Fundamentally, the two engines are very similar, and the most notable difference in their characteristics is that of piston stroke. Compared with a stroke of 7½ in. (190.5 mm.) for the Pegasus, the stroke of the Mercury series is only 6½ in. (165 mm.). A small reduction in capacity results from this shorter stroke, that of the Mercury being 1,519 cu. in. (24.8 litres), compared with the Pegasus capacity of 1,753 cu. in. (28.7 litres). The difference in overall diameter of the two engines is 51.5 in. (1.307 m.) for the Mercury and 55.3 in. (1.405 m.) for the Pegasus.

The latest types of Mercury of which information concerning power output may be published are the series VIII and IX, but other versions are about to be announced. The Mercury VIII and IX are identical except for the airscrew reduction gear ratio, which is 0.572 : 1 in the series VIII and 0.500 : 1 in the series IX. Both types have a net weight of 980 lb. (444 kg.), and both are rated at 810/840 b.h.p. at 14,000 ft. The following figures are also common to both types: Take-off power at maximum take-off r.p.m. of 2,650, 700/730 b.h.p.; international rated power, 795/825 b.h.p. at 13,000 ft.; maximum climbing r.p.m., 2,650; maximum power for all-out level flight (five minutes), 810/840 b.h.p. at 2,750 r.p.m. at 14,000 ft. Both types are approved for De Havilland variable-pitch airscrews.

The Pegasus Series

In the Pegasus series there is a rather greater variation of sub-types, no fewer than five of these being available at the present time. The five Pegasus engines are known as series X, Xc, XI, XII and XX respectively. The differences which have necessitated a distinction are mainly connected with airscrew-reduction gear ratios and degree of supercharging. For example, the X and Xc have the same gear ratio, i.e., 0.5 : 1, but whereas the rated height of the X is 6,250 ft., that of the Xc is 5,500 ft., the latter being intended chiefly for civil work and therefore is less supercharged. The series XI and XII Pegasus are both supercharged to 6,250 ft., but the airscrew gear ratios are 0.572 : 1 and 0.666 : 1 respectively. The Pegasus XX has the same gear ratio (0.5 : 1) as the X and Xc, but is supercharged to 10,000 ft. Maximum take-off r.p.m. for all types is 2,475.

The international rated power of the X, XI and XII is 810/850 b.h.p. at 4,000ft.; the Xc is rated at 740 b.h.p. at 3,500 ft., and the XX at 820 b.h.p. at 9,000 ft. Similarly, the maximum power for all-out level flight of the X, XI and XII is 875/915 b.h.p. at 6,250 ft., while that of the Xc is 830 b.h.p. at 5,500ft., and the XX 925 b.h.p. at 10,000 ft. Maximum speed for level flight (5 mins.) is 2,600 r.p.m. for all types. The X, XI and XII weigh 1,005 lb. net., the Xc and the XX 1,015 lb. The maximum take-off power of the X, XI and XII is 920/960 b.h.p., of the Xc 920 b.h.p., and of the XX 835 b.h.p.

These figures indicate what has already been done in the way of getting extra power out of the different engines without materially increasing the weight. They do not represent finality, and soon we may hear of still further increases in power. The progress which has been possible is partly due to the introduction of fuels of 87 octane value, and partly to improvements in detail design and in the mechanical properties of the materials used.

Some idea of the painstaking care given to the development of the engines may be formed from the fact that nearly a million drawing office hours have gone to the evolution of the new series Mercury and Pegasus, while in one year 15,000 hours' running on single-cylinder units took place, and 10,000 hours of complete engine development running, of which 1,000 hours was at full throttle. Long periods of running under weak-mixture cruising conditions are another part of the searching tests, and in addition each engine type completes 200 hours' flight testing before being put into production. Add to these facts the extremely high quality of the materials used and the ex-

Bristol inlet and exhaust valves, the former with its gas-seal assembly. At the top is a set of triple concentric springs. The Stellited exhaust valves are salt-filled.

quisite workmanship put into the engines, and it will no longer be a puzzle why aero engines are expensive. Rather does one wonder that they can be produced at any practical figure at all. And, in point of fact, Bristol engines are *not* expensive on a basis of cost per horse power, compared with many foreign engines. It is true that some American engines are cheaper in first cost, but the price charged for spares is such that after a few months the American engine is probably dearer than the Bristol.

As the fundamental features of the Bristol engines are already well known to readers of *Flight*, no lengthy description should be needed here. The following notes relate both to the Pegasus and the Mercury series, these being similar except for the differences already outlined. The simplicity of the single-row, nine-cylinder radial has caused the Bristol company to adhere to the type for very many years, and the power obtained so far has been within the capacity of the type, but it may be recollected that in a lecture some two or three years ago Mr. Fedden referred to the possibility that for still higher powers the two-row type might have to be adopted. It is, of course, well known that the Bristol company also produce two nine-cylinder sleeve-valve engines, the Aquila and the Perseus. but with these we are not concerned for the present, and in the following only the poppet-valve type will be dealt with.

Problems Solved

The introduction of 87-octane fuels gave the aero engine designer an opportunity to get extra power out of a given cylinder capacity because he could increase compression ratio without running into detonation troubles. Increased engine speed also gave extra power, so that a net gain all around was to be expected, including improved fuel consumption at cruising speed. The greater stresses which resulted introduced a certain number of fresh problems, as did also the use of leaded fuels (4 c.c. per gallon) if corrosion troubles were to be avoided. The results obtained show that the Bristol firm *has* overcome all difficulties.

In the latest Bristol engines the cylinders have been developed and improved so as to deal satisfactorily with the greater power output in conjunction with the new close-fitting, low-drag engine cowls. The steel cylinder barrel and aluminium alloy head have their fins very closely spaced (five per inch), and the fins are machined on both barrel and head to give exact proportions and thus ensure maximum cooling efficiency. It is rather surprising to learn that the total radiating surface is 166.5 sq. ft., this figure including an increase of 40 per cent. cylinder head area, as compared with the previous series of engines.

Among the detail components particularly affected by the greater power output and the use of leaded fuels are the valves. All Bristol engines have four valves per cylinder, and in the latest types the valve seats and exhaust valves are Stellited as a protection against corrosion. The exhaust valves are filled with sodium salt to improve the cooling, and the valve stems are hardened and have hardened buttons inserted in the stem ends to provide a durable wearing surface under rocker loads.

The four valves per cylinder are operated by push rods and rockers from a cam sleeve co-axial with the crankshaft. One of the photographs shows this drive, which gives a reduction ratio such that the cam sleeve runs at one-eighth engine speed. The well-known Bristol compensation gear incorporated ensures maintenance of the correct valve clearances when the cylinders get hot.

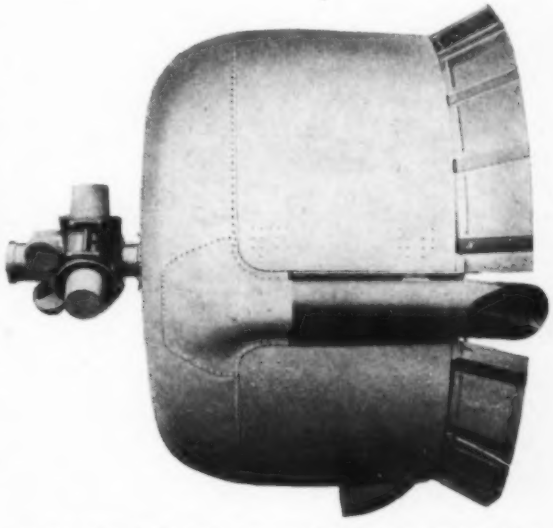
In order to permit the use of a solid big-end in the master connecting rod, the crankshaft is of the split type with a maneton joint. The master-rod big-end runs on a floating bush, which has the effect of reducing rubbing speeds. In the new engines the bush material has been improved to give increased stength and wear. The crankshaft is carried on one ball bearing and two roller bearings (Ransome and Marles).

A centrifugal-type supercharger is used, the speed of the impeller being from seven to ten times the crankshaft speed, according to the degree of supercharge required. The drive is transmitted from the crankshaft to the impeller *via* six short stiff coil springs to damp out torque variations, and in addition each of the intermediate driving gears is provided with a centrifugally operated clutch. so that high inertia loads on the impeller when the engine is accelerated and decelerated are avoided. The impeller itself is machined from a solid alloy steel forging.

Ignition is by two B.T.H. or Rotax magnetos of the four-pole, polar-inductor, twin-contact breaker type. The magnetos run at $1\frac{1}{8}$ engine speed. The whole ignition sytem is completely shielded by a Marconi harness. The plugs are K.L.G.

The Claudel-Hobson carburetter, of the A.V.T.85E. type, works in conjunction with a variable datum boost control, which protects the engine against excessive pressure in the induction pipe. The air intake is provided with a control, operated by the pilot, which allows the temperature of the incoming air to be varied to obtain the most efficient carburation.

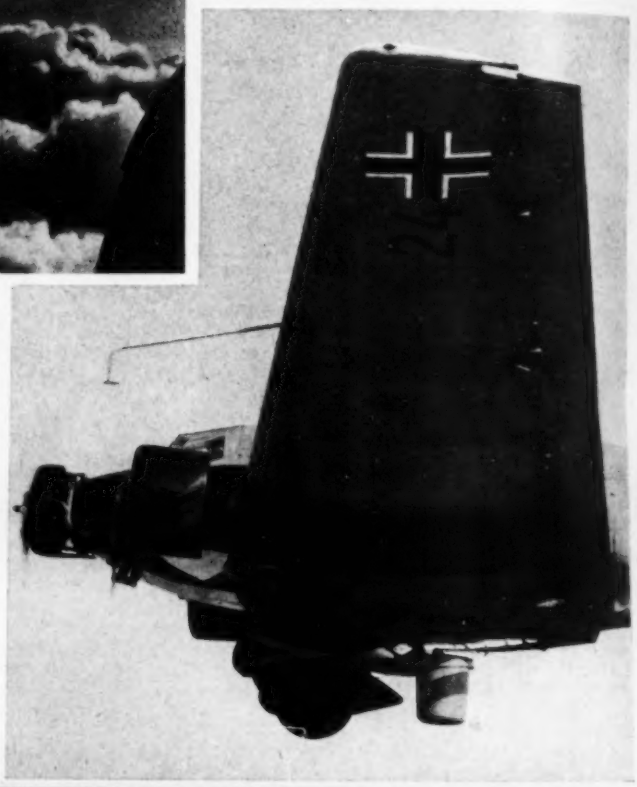
Engine cowlings of long or short chord are standardised by the Bristol company. For the long-chord cowl, controllable gill units are provided. The flaps are hinged to the trailing edge of the main cowl, the adjacent edges working in slots in metal strips so that when the strips are swung in or out, by an endless chain, sprocket and small screw jack mechanism, the edges are always restrained.



A side view of the Bristol Pegasus in its long-chord cowling Note the controllable gills which enable the cooling to be varied. The hub and blade roots of the De Havilland V.P. airscrew are also shown.

BLACK CROSSES

Germany's Air Force in Action



THE exclusive photographs on this page are of quite unusual pictorial merit and topical interest. Although depicting obsolescent types they do indicate that a high degree of efficiency is being attained in the practice of aerial fighting and formation flying. That above shows a Dornier heavy bomber (two liquid-cooled B.M.W.s) about to dive through a cloudbank preparatory to attacking a target below. Although it might be suggested that this is a composite picture there is no evidence on the original to prove this.

On the right is one of the military Junkers Ju.52s, large numbers of which are said to be in service. They have three B.M.W. Hornet engines and, it will be noted, a "dustbin" turret.

Below is a dramatic "shot" of a two-seater Heinkel making a climbing attack, the dark object in the foreground being the muzzle and vane foresight of a defending gunner's weapon.

It seems that this type of machine is used mainly for observation and would be placed, in this country, in the army co-operation category.

THE ARMS COMMISSION and AIRCRAFT MANUFACTURE

The Report Issued : "State Monopoly Undesirable" : A Ministry of Supply and Production?

AFTER examining a vast amount of evidence, the Arms Commission has arrived at the conclusion that State manufacture of armaments may be practicable but is undesirable. Its official Report was issued last week-end.

Under the full title "Royal Commission on the Private Manufacture of, and Trading in, Arms," the Commission was appointed and given its terms of reference by His Majesty the late King George V on February 9, 1935, and ratified and confirmed by King Edward VIII by Royal Warrant on February 10, 1936. Members of the Royal Commission were: Sir John Bankes, Sir Philip H. Gibbs, Dame Rachel Crowdy, Sir Thomas W. Allen, Sir Kenneth Lee, Harold Cooke Gutteridge, and John A. Spender. The secretary of the Commission was Mr. Edward Twentyman, and the assistant secretary Mr. D. Haigh. The Report, which is dated September 24, 1936, is signed by all the members of the Commission and is therefore presumably to be regarded as unanimous. A note in the Report reveals the fact that the cost was £7,341 10s.

The Report is divided into eight parts and contains five appendices. Part I is introductory and describes the procedure followed and similar information. Part II outlines the evidence submitted, and Part III deals with the subject of limitation of armaments. The practicability and desirability of the establishment of a State monopoly of armaments is treated at length in Part IV under two heads: The international aspects of State monopoly, and the problem of State monopoly in the United Kingdom. Ten pages of the Report are devoted to the evils and objections to which private manufacture is alleged to be open, and Parts VI, VII, and VIII deal with export control, miscellaneous, including the disposal of surplus arms, and a final summary of conclusions and recommendations. The five appendices contain summary of evidence, list of witnesses examined, list of persons and bodies who have submitted memoranda, a selection of these memoranda, and alleged malpractices by British armament firms in the pre-War period.

Conclusions

The summary of conclusions and recommendations of the Royal Commission are as follows:—

1. The most effective available means of removing or minimising the objections to the private manufacture of, and trade in, arms would be the limitation of arms by international agreement.

2. The establishment of a universal system of State monopoly of the manufacture of arms is likely to be impracticable, and in present conditions the promotion of general State monopoly should not be a part of the policy of this country.

3. The abolition of the private industry in the United Kingdom and the substitution for it of a system of State monopoly may be practicable; but it is undesirable. No sufficient case has in our opinion been made out for taking so drastic a step. We believe that the reasons for maintaining the private industry outweigh those for its abolition. We are of opinion that the necessities of imperial defence cannot be effectively met, in existing conditions, except by the maintenance in peace-time of a system of collaboration between the Government and the private industry of the country in the supply of arms and munitions.

4. We recommend that public officials (whether serving or retired) should not accept appointments with armament firms except with the approval of the Minister in charge of the Department in which they are serving or have served.

5. We are of opinion that this country should continue to promote and encourage the adoption of measures for the international regulation and control of the manufacture of, and trade in, arms. We believe that the proposals to this end recently submitted to the League of Nations by the Government of the United States afford a basis on which agreement might be reached.

6. We recommend that the Government should assume complete responsibility for the arms industry in the United Kingdom and should organise and regulate the necessary collaboration between the Government and private industry; that this responsibility should be exercised through a controlling body, presided over by a Minister responsible to Parliament, having executive powers in peace-time and in war-time, over all matters relating to the supply and manufacture of arms and munitions, costing and the authorisation of orders from abroad.

We further recommend that the Government's own manufacturing establishments should be fully equipped for the production in some measure of naval, military, and air armaments of all types.

7. We recommend that measures be taken to restrict the profits of armament firms in peace-time to a reasonable scale of remuneration, designed not only to prevent excessive profits, but to satisfy the public that they do so.

8. We are of opinion that the problems involved in formulating plans for the conscription of industry in war-time will have to be faced, and should be faced without delay.

9. We are of opinion that the administration of the system of licensing exports of arms should be governed by an outlook different from, and more positive in character than, that which now prevails; that licences should be granted only to such firms as shall have been specifically authorised to accept orders for export by the controlling body already recommended; that the grant of licences should be restricted to orders by foreign Governments, supported by import licences issued by those Governments which shall state that the goods will not be re-exported.

We recommend that the practice of issuing open general licences for the export of certain classes of arms, etc., be discontinued; that specific licences be required in all cases; and in particular that a rigid control be exercised over all exports of aircraft, whether classified as military or civil.

10. We recommend the complete cessation of the private export trade in surplus and second-hand arms and munitions of war.

Air Armaments

Of direct references to air armaments the Report contains but few. In connection with the extent of the reliance upon private armament firms, the Commission had this described to it by each of the defence services, that relating to the Air Force reading as follows:—

> "Apart from the Royal Aircraft Establishment at Farnborough, which is devoted to experiment and research only, the Air Ministry have no manufacturing resources whatever and are entirely dependent on the various private firms in this country, except for such armament as is manufactured for them by the Royal Ordnance Factories or the Naval Torpedo Factory."

Some of those who advocated nationalisation of arms manufacture had alleged that the Press of this country was utilised by the armaments industry as a means of improperly influencing public opinion in the matter of armaments. On this subject the Report states: "No evidence has been laid before us which we regard as supporting the charges that armament firms in this country have sought to influence public opinion through the control of the Press."

State control of export of arms comes in for a good deal of comment in the Report. After certain general recommendations concerning the standpoint from which the licensing system should be administered, the Report turns more specifically to the export of aircraft, of which the Report says:—

> "As a part of these recommendations we desire to urge also the abandonment of the present practice under which certain categories of prohibited exports are licensed for export to certain destinations under open general licences.

In making this latter recommendation we have in mind particularly the position in regard to the export of aircraft. Aircraft, assembled or dismantled, and aircraft engines are, by virtue of an open general licence issued by the Board of Trade on June 1, 1931, permitted to be exported without specific licence. The export of armament and military equipment for aircraft, it is true, can be effected only under specific licence, but such control as is exercised over the export of aircraft apart from their armament and military equipment is effected, so we are informed, by reason of a liaison which exists between the Air Ministry and the aircraft manufacturing firms.

"It has been repeatedly urged before us, and we feel that there is much force in the argument, that the convertibility of civil aircraft to military purposes and the increasing uses to which civil aircraft, particularly of the heavier type, can be put for military purposes, make it imperative that a more rigid form of control should be exercised over all exports of aircraft. We urge, therefore, that no exports of aircraft should be permitted except against specific export licences granted only after individual consideration in each instance.

Export of Aircraft

"Recent events suggest that there is a possibility that aircraft may be equipped and despatched from the United Kingdom for service in foreign countries. We understand the accepted opinion to be that aircraft do not come within the terms of the Foreign Enlistment Act, 1870, but the danger to world peace involved in such activities is manifest. We think that it is desirable that the Governmen should consider whether the provisions of the Act should not be extended so as to cover aircraft and to make it an offence to equip, arm, despatch or man aeroplanes or airships in or from the United Kingdom with the intent or reasonable belief that they will be used in connection with hostilities in which a friendly nation is engaged. If the offence is committed by a corporation the officers in control of its business should be deemed to be guilty of such offence unless they can establish that it was committed without their knowledge or consent. A presumption of this nature is already to be found in the Treaties of Washington Act, 1922."

On the general subject of export of arms, the Report states:

"While, therefore, we do not recommend, under existing international conditions, that the foreign trade in arms should be definitely abolished by this country acting alone, we are of the opinion that the administration of the licensing system should be governed by an outlook different from and more positive in character than that which now prevails. . . What we suggest is the abandonment of the existing policy under which licences are granted in the absence of a specific and compelling reason for refusing them and the substitution of a policy under which it is made a part of the duty of the official authorised to grant licences, acting upon grounds specifically authorised by the controlling body, to satisfy himself in each case that there is need for granting a licence taking all considerations into account."

A Ministry of Supply

The controlling body to which reference is made is envisaged by the Commission in a previous chapter of the Report to be "a body having executive and not merely advisory powers over supply, manufacture, costing, and the authorisation of orders from abroad. It should be presided over by a Minister responsible to Parliament. Its main duties would be the consideration and the decision of all questions of supply and manufacture in peace-time, the preparation in full detail of the regulations and plans for emergency expansion by co-operation between the Government establishments and private industry, the encouragement and development of scientific research, costing and the control of prices, and the inspection and the authorisation of all orders received from abroad by armament firms."

Among those who gave evidence before the Royal Commission were: Sir Eric Geddes, Major R. H. Mayo, and, on behalf of the Society of British Aircraft Constructors, Sir Robert McLean, Mr. H. Burroughes, Mr. C. R. Fairey, Mr. F. Handley Page, Mr. J. D. North, Lt. Col. Fell, and Mr. C. V. Allen. Evidence was also given by the following representatives of the Air Ministry: Air Marshal Sir Hugh Dowding, Wing Commander Medhurst, Mr. B. E. Holloway, and Mr. A. E. Slater.

Flight was among those who submitted memoranda but who were not subjected to oral examination before the Royal Commission.

An Improved Hawk Trainer

IT seems fairly certain that the Miles Hawk Trainer, already used by the R.A.F. Reserve School at Reading and by the Rumanian Government, will soon find its way into the Service for *ab initio* training But it will differ in certain respects from the present model, being fitted with a tail wheel, and a new type of single-strut undercarriage with Lockheed Airdraulic struts and Bendix brakes, generally similar to that of the Mohawk described on pp. 473-475 of this issue. Maximum and landing speeds are given respectively as 145 m.p.h. and 45 m.p.h., and the initial rate of climb as 1,200 feet per minute.

An Ultra-light "Twin"

ON Wednesday morning of last week Mr. E. G. Hordern, of the Heston Aircraft Company, made a successful test flight in the new ultra-light twin-engined monoplane built in the company's works for the Duke of Richmond and Gordon.

The machine was designed jointly by the Duke and Mr. Hordern, and its manufacture is a private commission unconnected with the regular business of the Heston Aircraft Company. Details and performance figures will, it is hoped, soon be available for publication. The power units are Continentals, which, being of the flat four type, should lend themselves very happily to a twin-engine installation such as this.

Forthcoming Events

November 6. Norfolk and Norwich Aero Club: Annual Ball.
November 12. R.Ae.S. Lecture: "Skin Friction," by Dr. F. W. Lanchester.
November 13-29. International Aero Exhibition, Paris.
November 19. R.Ae.S. (Coventry Branch) Lecture: "The Lorenz System," by Mr. F. Tomlinson.
November 19. R.Ae.S. Lecture*: "Aerodrome Design," by Mr. Nigel Norman.
November 20. South Coast Flying Club: Dinner and Dance, Grand Hotel, Brighton.
November 20. Eastbourne Flying Club: Dinner and Dance.
November 27. Lancashire Aero Club: Annual Ball. Palace Hotel, Buxton.
December 1. R.Ae.S. Students' Section Lecture†: "Stressed-skin Construction," by Mr. C. Moore.
December 1. Colleges of Automobile and Aeronautical Engineering, Annual Dinner and Dance, Grosvenor House, London.
December 3. R.A.F. Flying Club: Annual Ball at Grosvenor House, Park Lane.
December 10. R.Ae.S. Lecture*: "Civil Flying Boats," by Mr. A. Gouge.
December 17. R.Ae.S. Lecture*: "Profile Drag," by Prof. Melville Jones.
December 18. London Aeroplane Club: Dinner and Dance, Park Lane Hotel, London.

1937
January 14. R.Ae.S. Lecture*: "Magnesium Alloys," by Dr. C. H. Desch.
January 28. R.Ae.S. Lecture*: "Plastic Materials," by Dr. N. A. de Bruyne.
February 3. Royal United Service Institution Lecture: "The Anti-Aircraft Defence of Great Britain," by Maj.-Gen. R. H. D. Tompson.
February 11. R.Ae.S. Lecture*: "The Automatic Pilot," by Mr. F. W. Meredith and Mr. P. A. Cooke.
February 17. Royal United Service Institution Lecture: "Air Force Co-operation in Policing the Empire," by Air Comdr. C. F. A. Portal.
February 18. R.Ae.S. Lecture*: "Compression Ignition Engines," by Mr. A. H. R. Fedden.
February 18. Civil Aviation Service Corps Dance, First Avenue Hotel, London.
February 25. R.Ae.S. Lecture*: "Power Measurements in the Air," by Mr. N. S. Muir.
February 26. Brooklands and Associated Clubs: Dinner and Dance, May Fair Hotel, London.
March 11. R.Ae.S. Lecture*: "Airscrew Blade Vibration," by Major B. C. Carter.
April 8. R.Ae.S. Lecture*: "Control Problems," by Mr. A. G. Pugsley.
April 22. R.Ae.S. Lecture*: "American Engine Development," by Mr. G. J. Mead.

*All R.Ae.S. lectures take place at the Royal Society of Arts, 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.
†R.Ae.S. Students' Section meetings take place at 7 p.m. in the R.Ae.S. Library.

HERE and THERE

News of the Latest Developments in the Industry

C. W. A. Scott's Display Closes Down

THE following statement was issued last Monday from the London offices of C. W. A. Scott's Flying Display, Ltd.: "Mr. C. W. A. Scott has agreed, in conjunction with his co-directors, that C. W. A. Scott's Flying Display, Ltd., should go into voluntary liquidation.

"A statement of affairs will be available at a creditors' meeting to be held on November 10, and from this it will be seen that the unfortunate trading results were due almost entirely to the abnormally bad weather during the summer of 1936."

A Titanine Dividend

AN interim dividend of 7½ per cent. actual for the first four months of its existence as a public company has been declared by Titanine, Ltd., whose shares were issued to the public in June this year. This dividend follows the recent announcement made by the company of a 50 per cent. expansion in its Colindale works. It was stated that this expansion had been necessitated by the great increase in aircraft production and also by the increasing industrial demand for cellulose lacquers.

Mollarts Move In

SO great has become the demand for the M.E. patent universal ball joint that the makers, The Mollart Engineering Co., Ltd., have laid out the whole of their new factory on the Kingston By-pass at Surbiton for its production in large quantities. Both aircraft and engine manufacturers have found a great many uses for this accessory, and it is worthy of note that it figures in the specification of the Short Empire flying boats.

The new factory covers an area of 21,000 sq. ft. and stands on a site of 2½ acres. There are five bays measuring 150 ft. by 27 ft. 9 in., and two more will shortly be added. The firm is moving over from its Thames Ditton factory within the course of the next few days.

Blackburn Affairs

IT may be recalled that the firm of Blackburn Aircraft, Ltd., was incorporated last April in order to acquire, *inter alia*, the whole of the issued share capital of the Blackburn Aeroplane and Motor Company, Ltd., and North Sea Aerial and General Transport, Ltd., with a view to taking over in due course the businesses carried on by them.

In order to enable these businesses to be acquired as part of the scheme of reconstruction then contemplated, it has now been arranged that both the original companies should be put into voluntary liquidation to-morrow, November 6, and that they should forthwith hand over their businesses without interruption to the new company.

It is emphasised the liquidation is in the nature of a formality only, that all debts and liabilities of the original companies owing at the date of liquidation will be paid in full in the ordinary course of business by Blackburn Aircraft, Ltd., and that the businesses of the two companies will be carried on exactly as hitherto by that company.

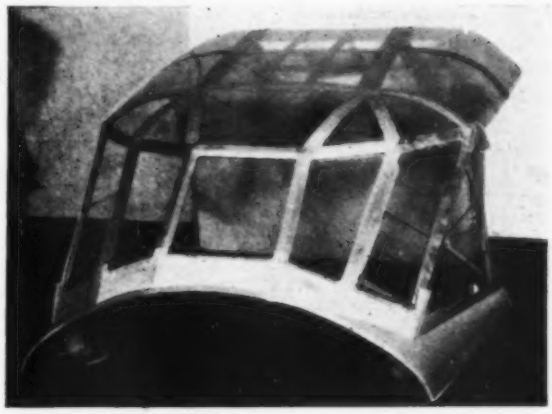
A.G.S. Requirements

THE firm of Aircraft General Supplies, Ltd., whose bonded warehouse is at London Air Park, Feltham, are extremely busy at the moment supplying material and A.G.S. requirements.

A director of A.G.S., Ltd., Mr. A. D. Duncan, late of Rollasons of Croydon, tells us that in order to maintain their reputation for deliveries of all parts and materials from stock they are having to look eighteen to twenty-four months ahead in replacing stocks for which there exists a heavy demand.

In the present circumstances, with material manufacturers working to capacity and the consequent lengthy delivery periods, A.G.S., Ltd., by thus anticipating the demands of their customers, are able to offer very useful service to the industry.

The company's steel tubing section is stocked with a wide range of material covering a variety of specifications, and a floating stock of over 10,000 gross of bolts is to be maintained. Monthly lists of stock are to be published.



Intricate workmanship in a windscreen and cockpit enclosure for a well-known type of aircraft—an example of the work now being carried out, as related below, by Helliwells, Ltd., of Dudley.

Exclusively for Aircraft

HAVING had considerable experience in the manufacture of such parts as windscreens for the automobile industry, Helliwells, Ltd., of Dudley, have forsaken their old activities to concentrate on aircraft parts. The entire factory is now devoted to such work, and the firm is in a position to manufacture a variety of intricate articles to A.I.D. limits. Among the items that are at present being made are bomb-traps, windscreens and complete cabin enclosures, ammunition containers, windows and window frames, fuel tanks and many other parts necessitating the use of sheet metal.

When all the proposed new plant and tool room equipment is complete—and it is rapidly nearing completion—production will be speeded up considerably, and the firm does not anticipate any delivery difficulties. The organisation is well equipped to deal with sheet steel, aluminium, light alloys, welding and glazing.

Aircraft at Aldergrove

IN the note under an illustration on page 428 of last week's issue it was stated that the machines depicted belonged to No. 502 (Ulster) (Bomber) Squadron. We now learn that they belonged to a visiting squadron.

Windows on the Empire

AN interesting feature of the photograph of the Short Empire flying boat's cockpit, on page 433 of last week's issue, was the characteristic curvature of the windows. These were made of Rhodoid—manufactured by May and Baker, Ltd., of Dagenham, London—and moulded to shape by Short Bros. themselves.

Looking Ahead

NUMBER 6 model Luxor goggles, fitted with "Meyflex" synthetic lenses, as now used by the R.A.F., are offered for Christmas gifts in pigskin cases at 52s. 6d. with any two or three initials stamped on the case. The number 12 model goggles will be priced at 35s. inclusive. Full details may be obtained from E. B. Meyrowitz, 1a, Old Bond Street, London, W.1.

On the Spot

IT is announced that the Exactor Control Co., Ltd., has moved its registered offices from Lower Regent Street, London, W1, to its works at Mount Pleasant, Alperton, Middlesex. This, it is stated, will enable closer contact to be made with production of the Exactor remote control and its allied hydraulic systems. The increasing demand for these components has made considerable extensions necessary.

AN AMBASSADOR-at-LARGE

The British Aircraft World Pays Tribute to Lester Gardner

THAT a realisation of the terrible havoc which can be wrought by air attack may yet prove to be the salvation of mankind, and that in this indirect way air armaments may ultimately prove the great factor for peace, was a theme touched upon by more than one speaker at the dinner to Mr. Lester Gardner given jointly by the Royal Aeronautical Society, the Royal Aero Club, and the Society of British Aircraft Constructors last week at the Park Lane Hotel, London.

Chairman of the party was Sir Robert McLean who, in addition to being chairman of the S.B.A.C., is also chairman of Vickers (Aviation), Ltd. Sir Robert, who was supported by Mr. Lindsay Everard, M.P. (chairman of the Royal Aero Club), and Mr. H. E. Wimperis, Director of Scientific Research at the Air Ministry (president of the R.Ae.S.), as chief hosts, explained that when it was first discovered that Mr. Lester Gardner was coming over from America, the different bodies and societies all wanted to " throw a nice, small, confidential party." As Mr. Gardner's stay in England was, unfortunately, to be a very short one, it had been decided to hold instead this dinner at which members of the three bodies could meet to do honour to the man who had done so much for Englishmen who visited the United States. Sir Robert recalled that whenever any representative of British aviation was going to the U.S.A., they just let Mr. Gardner know, and he promptly arranged that the British visitor was shown all that was to be seen.

Ten years ago Mr. Gardner had visited this country, and at that time he had flown on all the air routes then existing in the world. This time he had come across " in a gas bag," and afterwards had toured several European countries and Russia by heavier-than-air craft. He hoped Mr. Gardner would tell them something about his experiences.

After paying a tribute to American scientists, engineers and designers, Sir Robert asked Mr. Gardner to take back to America the thanks and the recognition of the British aviation community.

Hands Across the Table

Mr. Lindsay Everard expressed the thanks of members of the Royal Aero Club for all the assistance which Mr. Gardner had given to British visitors to America, and expressed the hope that some day, as a result of the work of the trinity represented there that evening, a British aircraft would carry visitors to America.

Mr. Wimperis said that the work of Lester Gardner in connection with the American Institute of the Aeronautical Sciences made him very dear to British research people. He and Mr. Gardner had just returned from a visit to Germany to the meeting of the Lillienthal Gesellschaft. Among the many interesting things they saw there was Dr. Prandtl's room at Göttingen. It was a large circular room without windows, and it rotated. That room was the only room in the world across which Lester Gardner could not walk in a straight line at any time of the day or night ! In conclusion, Mr. Wimperis caused much amusement by quoting a learned lecturer at the annual meeting of the British Association, who had said that it had been found that the size of brain had been found to be largest in those reptiles which had taken to flying.

Mr. Lester Gardner said that in America they regarded the Royal Aeronautical Society as the most distinguished in the world. Until a few years ago, they had nothing comparable in America and so they wrote to the R.Ae.S. and asked how to do it. The R Ae.S. sent all possible information, and the Institute of the Aeronautical Sciences was a very modest attempt to found a society which would do for America what the R.Ae.S. had done for Great Britain.

He would not tell them anything of American aviation that evening, but would, instead, give some impressions of his trip to Europe. Of his trip across in the *Hindenburg* Mr. Gardner said it was uneventful aeronautically speaking, but he related an amusing account of a *sängerbund* (which the dictionary would have us believe means " choral society ") that kept themselves and the rest of the passengers awake until 4 a.m.

In Russia he saw a good deal that was of interest. At the great motor institute he saw running a new aero engine of 1,250 horse power. Sixteen of the huge Maxim Gorky monoplanes were being built to replace the one lost in a collision, and each was to be powered by four of these new engines. He was greatly impressed by the parachute experience given to thousands of volunteers in Russia.

Mr. Gardner had also visited Germany, Italy and France, and said he was certain that Germany would be heard of soon in connection with some very interesting new aircraft types. In Italy he visited Guidonia (the huge new aeronautical centre established to commemorate the late General Guidoni, who was for a time Italian Air Attaché in London). He was impressed by the luxury of the equipment. The scientists literally worked in marble halls. The work being done in the supersonic wind tunnel at speeds above the speed of sound was very up to date. In France the work being done in the full-scale wind tunnel at Chalais-Meudon was giving good results.

Expansion

Turning to England, Mr. Gardner referred to the great expansion going on, not only in this country but in all countries, and said that if it went on and was used for war, it would annihilate civilisation. The only hope, he thought, was to build so powerful an air arm that fear of what it could do would ensure peace. To the S.B.A.C. he would say: " May your 'shadow ' never grow less."

Three other American guests made short speeches: Mr. T. P. Wright, of the Wright Corporation, Mr. Paul Johnston, Editor of *Aviation*, and Commander Jim Taylor, of the U.S. Navy.

Mr. Wright expressed the view that scientifically Great Britain led the world, but perhaps America could be said to have taken the lead in translating science into engineering. They all knew the present formula: Low-wing monoplane, retractable undercarriage, flaps and so forth. What would be the next step ? A good many years ago Professor B. Melvill Jones, of Cambridge, had outlined the ideal streamlined aeroplane. As compared with that time, the power wasted was now only something like 15 per cent. That might be still further lowered by reducing skin friction. For example, they would have to get rid of rivets and lap joints. Much work was being done at present on high-altitude flying. His own opinion was that soon we should be flying at 35,000 ft. with passengers and crew in supercharged cabins. Speed was the one thing flying had to sell. High speed meant high wing loading, and he thought assisted take-offs would soon permit a doubling of the wing loading, with consequent gain in cruising speed.

Co-operation

Mr. Paul Johnston said he thought the most significant thing in modern American air transport was co-operation among the different operating companies. Experience in operation, maintenance and similar problems was now pooled, and this was leading to standardisation of specifications. One result of all this was the new Douglas D.C.4 which would be flying next year. He concluded by extending to all present greetings from Mr. Edward P. Warner.

Commander Taylor, of the U.S. Navy, who had been asked to say something about flight testing in America, said that this was rather different, owing to the difference in the aircraft. In America it was necessary to be able to get machines from one coast to the other quickly, and this meant a large petrol capacity. Referring humorously to mass production, Commander Taylor said he understood that in England mass production meant building more machines with more men. In America, quantity production meant producing more machines with fewer men. Hence different production methods were employed.

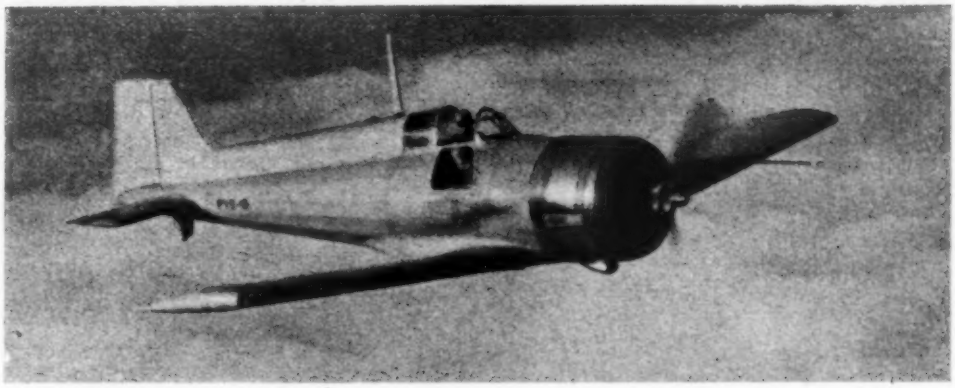
The introduction of flaps on modern aircraft had introduced a new technique of piloting. The flaps already had the effect of increasing the effective angle of incidence, and if the pilot attempted the usual tail-down landing, the smallest error in height might have serious consequences. He thought there was still much to be learnt about handling modern aircraft.

Concerning the recent altitude flight by Sqn.-Ldr. Swain, Commander Taylor drew attention to an article by Professor

(Concluded on page 475.)

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS



SWIFT POISON: The Vickers Venom single-seater fighter with Bristol Aquila sleeve-valve engine.

CADETS FROM AUSTRALIA

In the future fifty cadets for the Royal Australian Force, instead of fifteen as previously arranged, are to be sent annually to Great Britain for training.

DAMAGE AT ABBOTSINCH

Nos. 21 and 34 (Bomber) Squadrons are to be moved temporarily from Abbotsinch, near Glasgow, to Lympne. Some hangars at Abbotsinch and twelve machines were considerably damaged in the recent gale. It is not certain that these two squadrons will return to Abbotsinch.

MOVE OF No. 3 (BOMBER) GROUP

Subject to the completion of works services, Headquarters, No. 3 (Bomber) Group, will move from Andover to Mildenhall at the beginning of January, 1937. The move is to be completed by January 7.

MOVE OF No. 2 (BOMBER) GROUP

Subject to the move of Headquarters, No. 3 (Bomber) Group, from Andover to Mildenhall being completed, Headquarters, No. 2 (Bomber) Group will move from Abingdon to Andover during January, 1937. The move is to be completed by January 28.

MODERN FOREIGN LANGUAGES

Hebrew has been added to the list of languages for which tests for colloquial proficiency are held.

ARMISTICE CEREMONY

At 11.00 hours on Sunday, November 8, Air Chief Marshal Sir Edward L. Ellington, G.C.B., C.M.G., C.B.E., will lay a wreath at the foot of the R.A.F. War Memorial, Victoria Embankment, on behalf of the Royal Air Force. Dress for serving personnel—Service dress (without decorations) and greatcoats.

FORMATION OF STATION HEADQUARTERS

A station headquarters will form at Feltwell, near Brandon, Suffolk, on January 27, on which date the station will be placed under the command of the A.O.C.-in-C., Bomber Command, in No. 3 (Bomber) Group.

A station headquarters will form at Upwood, Ramsey, Huntingdon, on January 27, 1937, on which date the station will be placed under the command of the A.O.C.-in-C., Bomber Command, in No. 2 (Bomber) Group.

These aerodromes may be used with effect from January 1 for aircraft of personnel visiting the station on duty in connection with the opening. Only aircraft fitted with tail wheels will be permitted to land and no facilities of any kind will be available. The aerodromes will not be available for general use until March 4.

No. 607 (COUNTY OF DURHAM) SQUADRON

No. 607 (County of Durham) (Bomber) Squadron will be renamed No. 607 (County of Durham) (Fighter) Squadron with effect from November 1.

CHANGE OF NAME

The name of the R.A.F. Camp, Novar, Ross-shire, has been changed to R.A.F. Camp, Evanton.

SPECIALIST SIGNALS COURSE

The undermentioned officer, having successfully completed a specialist S* course at the Ecole Supérieure D'Electricité and the Royal Aircraft Establishment, is granted the symbol S*:—Flt. Lt. E. H. Bellairs.

FORMATION OF No. 17 (TRAINING) GROUP

No. 17 (Training) Group will form in the Coastal Command at Lee-on-the-Solent on December 1, 1936, and move to Calshot on January 1, 1937, when it will take over executive command of the following:—

Calshot.—R.A.F. Station, Headquarters, and Training Squadron.

Gosport.—R.A.F. Station, Training Squadron, Torpedo Section, Storage Unit, Coast Defence Development Unit.

Lee-on-the-Solent.—R.A.F. Station, School of Naval Co-operation, No. 1 Gunnery Co-operation Flight.

Southampton.—R.A.F. Station.

FORMATION OF No. 16 (RECONNAISSANCE) GROUP

No. 16 (Reconnaissance) Group will form in the Coastal Command at Lee-on-the-Solent on December 1, 1936, and move to Bircham Newton by January 1, 1937, when it will take over executive command of the following:—

Bircham Newton.—R.A.F. Station, No. 206 (G.R.) Squadron, No. 220 (G.R.) Squadron, No. 269 (G.R.) Squadron.

Calshot.—No. 201 (F.B.) Squadron.

Mount Batten.—R.A.F. Station, No. 204 (F.B.) Squadron.

Felixstowe.—R.A.F. Station (Personnel administration only), No. 209 (F.B.) Squadron, Landguard Fort Bombing Range.

Pembroke Dock.—R.A.F. Station, No. 210 (F.B.) Squadron, No. 228 (F.B.) Squadron, R.A.F. Floating Dock.

Donibristle.—R.A.F. Station, No. 22 (T.B.) Squadron, No. 42 (T.B.) Squadron, Dalgety Bay Bombing Range.

Usworth.—R.A.F. Station.

FLYING ACCIDENT

The Air Ministry regrets to announce that A.P/O. George Edmund Hollings, of No. 43 (Fighter) Squadron lost his life in an aircraft accident which occurred at Hawarden, Flintshire, on October 30. A.P/O. Hollings was the pilot and sole occupant of the aircraft.

ROYAL AIR FORCE GAZETTE

London Gazette, October 27, 1936

General Duties Branch

Flt. Lt. N. R. Buckle is granted a permanent commission in that rank (June 1); C. J. Donovan is granted a short service commission as Pilot Officer on probation with effect from and with seniority of October 12.

The following are granted short service commissions as Acting Pilot Officers on probation with effect from and with seniority of October 12: H. R. MacD. Beall, N. H. Brace, R. T. Chisholm, M. J. Earle, T. H. T. Forshaw, A. R. R. Gifford, E. D. Godfrey, D. L. R. Halliday, D. R. Hoar, R. A. Holloway, H. E. Hopkins, J. G. McGrail, A. J. Mould, D. P. W. R. Robinson, D. J. Rogers, M. H. Roth, C. G. Saunders, H. J. Seagrim, J. T. L. Shore, A. Simpson, W. B. Smith, T. W. Storey, C. A. Wallis, E. T. Watson, R. D. Williams.

Acting Pilot Officer on probation A. C. Heath is confirmed in rank and graded as Pilot Officer (April 16).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—S. J. Marchbank, J. K. Rotherham, P. S. Salter (October 1); F. G. Mason (October 9); E. C. Kidd, A.F.M. (October 10); G. D. M. Blackwood (October 25).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—A. D. Murray, K. N. Lees, J. Duncan (September 16); L. M. Laws (October 16).

Sqn. Ldr. E. K. D. Robertson, A.F.C., is placed on the retired list on account of ill-health (October 24); Flt. Lt. C. C. Musselwhite (Capt., The Middlesex Regt.) relinquishes his temporary commission on return to Army duty (October 10); Lt. J. S. Stead, R.N., Flying Officer R.A.F., relinquishes his temporary commission on return to Naval duty (September 15); Sub-Lt. N. G. Hallett, R.N., Flying Officer, R.A.F., relinquishes his temporary commission on return to Naval duty (October 17).

Chaplains Branch

The Rev. C. J. F. Gilmore is granted a short service commission with the relative rank of Squadron Leader, with effect from and with seniority of October 14.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

The following are granted commissions in Class A in the ranks stated on resigning their commissions in the Special Reserve (May 25):—F/O. T. R. Leatherdale (seniority January 25, 1933); F/O. D. R. P. Mills (seniority May 13, 1933); P/O. P. A. Simpson (seniority August 18, 1934).

Sqn. Ldr. W. E. Reason (R.A.F. retired) is granted a commission as Flight Lieutenant (Honorary Squadron Leader) in Class C (August 25); Flt. Lt. J. R. Brown, D.F.C., is transferred from Class A to Class B (August 4) (substituted for the notification in the *Gazette* of August 18).

The following Flying Officers are transferred from Class AA (ii) to Class C on the dates stated:—G. N. Beckmann (February 10); E. P. Whitfield (July 23).

F/O. A. T. Brock is transferred from Class C to Class AA (ii) (August 28).

The following Flying Officers relinquish their commissions on completion of service on the dates stated and are permitted to retain their rank:—E. W. Jordan (April 20); H. A. Francis, A.F.C. (June 11); E. D. Trask (August 7); A. L. Muir (September 13).

F/O. E. J. Dease relinquishes his commission on completion of service (July 29).

SPECIAL RESERVE

General Duties Branch

The following resign their commissions consequent on the conversion of the Special Reserve to the Auxiliary Air Force:—F/O. T. R. Leatherdale (May 25); F/O. D. R. P. Mills (May 25); P/O. K. W. Gough (May 18); P/O. P. A. Simpson (May 25).

AUXILIARY AIR FORCE

General Duties Branch

No. 504 (COUNTY OF NOTTINGHAM) (BOMBER) SQUADRON.—P/O. K. W. Gough is granted a commission in that rank with effect from May 18 and seniority of May 27, 1935.

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—P/O. C. J. Donovan relinquishes his commission on appointment to a short service commission in the Royal Air Force (October 12).

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. H. Hodge (September 2), A. Rintoul (September 3).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders—D. S. Brookes to No. 74 (F) Squadron, Hornchurch; to command, 1.10.36. G. G. Walker, to R.A.F. Record Office, Ruislip; for administrative duties, 9.9.36.

Squadron Leader.—R. M. C. Macfarlane, M.C., to Directorate of Staff Duties, Air Ministry, 1.10.36.

Flight Lieutenants.—F. C. Daubney, to Headquarters, R.A.F., India, New Delhi, 15.10.36. L. F. Sinclair, to No. 28 (Army Co-operation) Squadron, Ambala, India, 15.10.36. A. V. Hammond, to No. 31 (Army Co-operation) Squadron, Karachi, India, 15.10.36. C. H. Smith, to Aircraft Park, Lahore, India, 15.10.36. J. E. Allen, to School of Air Navigation, Manston, 21.10.36. C. D. C. Boyce, to No. 97 (B) Squadron, Boscombe Down, 19.10.36. A. L. Christian, to No. 218 (B) Squadron, Upper Heyford, 20.10.36. J. B. Tatnall, to No. 2 Flying Training School, Digby, 15.10.36. H. S. Laws, to No. 1 School of Technical Training (Apprentices), Halton, 19.10.36. C. E. S. Lockett, to No. 15 (B) Squadron, Abingdon, 16.10.36.

Pilot Officers.—L. H. Pomeroy, to No. 56 (F) Squadron, North Weald, 15.10.36. V. C. Wood, to No. 214 (B) Squadron, Scampton, 12.10.36. G. A. L. Cheatle, A. G. T. James, C. H. Jones, to No. 20 (Army Co-operation) Squadron, Peshawar, India, 15.10.36. L. J. Kiggell, C. A. Masterman, J. Vivian, to No. 28 (Army Co-operation) Squadron, Ambala, India, 15.10.36. L. A. G. S. Lewer, P. Stevens, to No. 39 (B) Squadron, Risalpur, India, 15.10.36. A. B. Olney, A. E. Saunders, A. J. Young, to No. 60 (B) Squadron, Kohat, India, 15.10.36. C. L. Page, to School of Army Co-operation, Old Sarum, 16.10.36. G. F. Lerwill, to No. 49 (B) Squadron, Worthy Down, 6.10.36. D. E. Catteli, to No. 10 Flying Training School, Tern Hill, 5.10.36. C. J. Donovan, to No. 107 (B) Squadron, Andover; on appointment to a short service commission as Pilot Officer, on probation, 12.10.36.

The undermentioned are posted to the Units shown with effect from 11.10.36:—P. J. Sanders, to No. 1 (F) Squadron, Tangmere. F. S. Stapleton, to No. 3 (F) Squadron, Kenley. R. E. Baxter, to No. 104 (B) Squadron, Hucknall. J. H. Chaplin, to School of Air Navigation, Manston. G. T. B. Clayton, to No. 107 (B) Squadron, Andover. N. H. des C. Brouard, D. G. Perry, to 215 (B) Squadron, Driffield. I. M. Brodie, F. E. Burton, D. L. Davies, J. M. Downton, D. Ford, P. R. Woodward, to School of Air Navigation, Manston.

Acting Pilot Officers.—The undermentioned are posted to the Units shown with effect from 11.10.36:—E. A. Keegan, A. S. K. Scarf, J. R. Sullivan, E. C. S. Fewtrell, G. R. E. Gregory, to No. 9 (B) Squadron, Scampton. J. A. Coltart, to No. 15 (B) Squadron, Abingdon. P. M. Brothers, G. Harris, H. á'B. Russell, to No. 32 (F) Squadron, Biggin Hill. K. J. Powell, W. T. C. Seale, R. D. Speare, to No. 38 (B) Squadron, Mildenhall. R. A. Barton, S. T. Meares, J. G. Theilmann, to No. 41 (F) Squadron, Catterick. R. L. Lorimer, A. W. Pennington-Legh, to No. 43 (F) Squadron, Tangmere. W. S. Pryde, to No. 49 (B) Squadron, Worthy Down. J. D. Stern, to No. 58 (B) Squadron, Driffield. J. H. G. McArthur, D. R. Miller, E. C. Wolfe, to No. 64 (F) Squadron, Martlesham Heath. A. O. Bridgman, S. H. Kernaghan, J. P. S. Packer, to No. 83 (B) Squadron, Turnhouse. L. S. Dawson, to No. 101 (B) Squadron, Bicester. H. L. Smeddle, J. P. Wells, to No. 103 (B) Squadron, Andover. T. D. B. Blake, L. G. Hamer, to No. 107 (B) Squadron, Andover. C. J. C. Lee, to No. 139 (B) Squadron, Wyton. D. T. Collins and L. M. Gaunce, to No. 3 (F) Squadron, Kenley. G. Drew, M. E. Reid, and A. W. Ridler, to No. 17 (F) Squadron, Kenley. D. Genders, to No. 19 (F) Squadron, Duxford. J. F. Roulston and T. Rowland, to No. 41 (F) Squadron, Catterick. J. W. C. Simpson and J. L. Sullivan, to No. 43 (F) Squadron, Tangmere. J. H. Wedgwood, to No. 65 (F) Squadron, Hornchurch. R. H. G. Grey, to No. 83 (B) Squadron, Turnhouse.

Stores Branch

Flight Lieutenants.—P. Dennehy, to Directorate of Equipment, Air Ministry, 19.10.36. M. F. Tomkins, to Directorate of Equipment, Air Ministry, 12.10.36. J. E. Reynolds, to No. 1 Stores Depot, Kidbrooke, 10.9.36. C. Thripp, to Aircraft Depot, Karachi, India, 15.10.36.

Flying Officer.—T. King, to No. 2 (Indian Wing) Station, Risalpur, India, 15.10.36.

Pilot Officer.—M. C. R. White, to No. 2 (Indian Wing) Station, Risalpur, India, 15.10.36.

Accountant Branch

Squadron Leaders.—W. R. Westcombe, to Headquarters, Bomber Command, Uxbridge; for Accountant duties vice Sqn. Ldr. W. E. Fisher, M.C., 19.10.36. C. W. Price, to Headquarters, Training Command, Market Drayton; for Accountant duties vice Flt. Lt. B. G. Drake, 21.10.36. H. E. Cardwell, A.F.C., to R.A.F. Station, Manston; for Accountant duties vice Sqn. Ldr. H. W. Capener, 19.10.36.

Medical Branch

Squadron Leader.—A. Harvey, to Directorate of Medical Services, Air Ministry; for Staff duties, 19.10.36.

Chaplains Branch

Revd. M. K. McLeod, to R.A.F. Station, Manston, 16.10.36. Revd. S. H. Keen, to R.A.F. Depot, Uxbridge, 19.10.36.

Commissioned Signals Officer

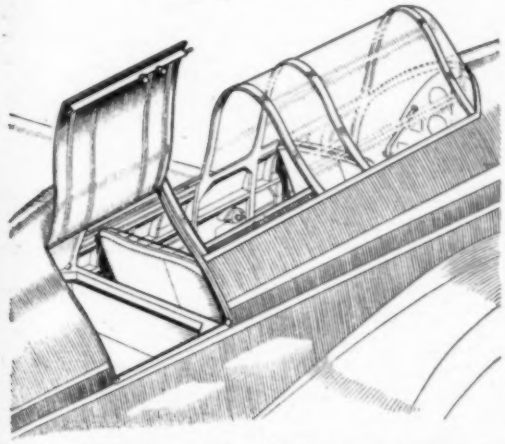
Flying Officer.—J. R. Welsh, A.F.M., to R.A.F. Station, Driffield, 16.10.36.

LINDBERGH BUYS BRITISH

His New Miles Mohawk Described : A High-performance "Custom-built" Tourer

A happy "shot" of Colonel Lindbergh familiarising himself with the engine installation of his new high-speed tourer

WHEN Colonel Lindbergh settled in this country he surveyed our range of touring machines, and, although unstinting in his praise, was unable to find exactly what he wanted. So, some months ago, he "went into a huddle" with Mr. F. G. Miles with a view to placing an order for a machine designed expressly to meet his requirements. The fruit of this collaboration was the Miles Mohawk, a two-seater, long-range, high-speed monoplane with a supercharged Menasco Buccaneer engine. Phillips and Powis are quite prepared to build replicas, but do not regard the machine as a production type.



There is a large luggage locker behind the cockpit enclosures on the Mohawk. The flexible transparent panels over each seat can be pushed down into the fuselage sides.

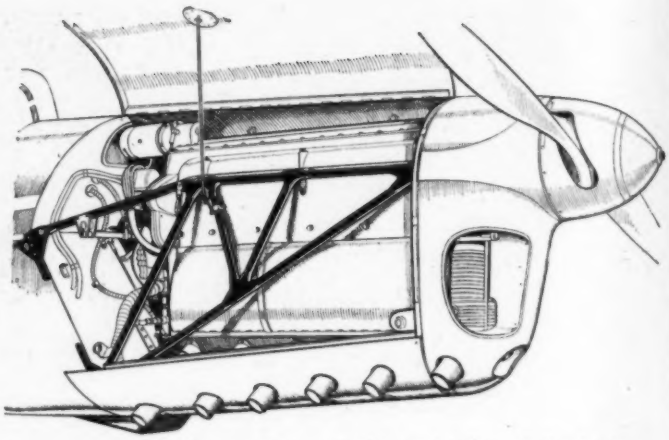
To say that the lines of the Mohawk are the most attractive yet conceived on the P. and P. drawing boards is praise enough of its appearance. It is registered G-AEKN and finished in orange and black at Col. Lindbergh's express wish, because this combination shows up most readily under all weather conditions.

It is essentially a typical Miles two-seater, but differs from its forebears in its cockpits, undercarriage, tail unit and its supercharged power plant.

Structurally it is of wood and follows standard Miles practice; in fact, the outer panels of the wings are similar to those of the Hawk Major, with two spars and ply covering taking drag and torsional stresses, but with strengthened spars to take care of the greater all-up weight and a few minor modifications to permit the installation of extra fuel tanks. Miles split trailing-edge flaps are incorporated. In addition to the outboard tanks there are two in the centre section. The basic design of the wooden stressed-skin fuselage and fabric-covered tail unit does not depart from previous Miles technique, although certain members have been specially strengthened.

English eyes will soon settle on the Menasco Buccaneer B6-S six-cylinder, in line, inverted air-cooled engine supercharged by a centrifugal blower to give 200 h.p. at 2,250 r.p.m. at 4,500 ft. A detailed description of this power plant was given in *Flight* of September 10 this year. Incidentally, it might be useful to remember that, externally, a Menasco installation may be distinguished from a Gipsy in that the cooling air chute is on the starboard instead of on the port side. The particular engine in the Mohawk has been imported from America, but the licence for the B6-S and other Menasco models was lately secured by Phillips and Powis. The engine is mounted on blocks of Ferodo brake lining and small

The Mohawk on test, showing the front cockpit open.

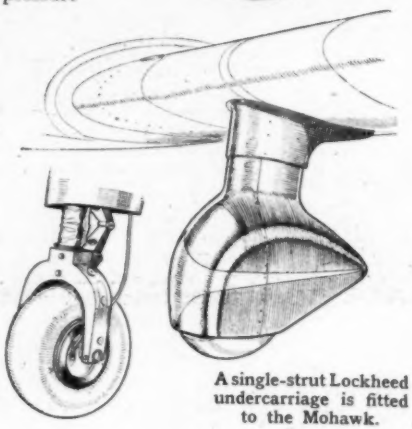


The installation of the supercharged Menasco Buccaneer engine. Note that the cooling chute is on the starboard side.

springs, allowing a ½in. compression. For the time being the airscrew is a fixed-pitch metal Fairey, but provision has been made for a variable-pitch type. Hamiltons, incidentally, are not yet marketing a V.P. screw suitable for Menasco, although De Havillands, their English licensees, have developed successful models for engines of similar ratings.

Naturally the supercharger (driven at 8.75 times engine speed) results in a somewhat longer power unit than is normally seen in light aeroplanes, but happily Col. Lindbergh asked for rudder pedals instead of a bar so the final installation of engine and controls was made in less space than might have been imagined. An Eclipse generator and electric starter are fitted and the induction pressure is read off on a Smith's boost gauge.

The tandem seats are mounted on front and rear spars and are sheltered by as neat a transparent roof as we have seen. This roof, with its long tail fairing tapering away to the fin, is of an inverted U section merging smoothly into the maximum cross section of the fuselage and resulting in a hollow along the fuselage. Col. Lindbergh will normally fly from the front seat, with Mrs. Lindbergh behind, and the reach of the adjustable rudder pedals has been designed accordingly. Between the seats is a fixed portion of the transparent enclosure, but flexible panels immediately above each occupant meet on the centre line of the fuselage, being pushed down into the side walls for entry, exit and "open cockpit" flying. The concave sides of the enclosure permit one eye to be put outside in bad weather, leaving the greater portion of the face sheltered. A capacious luggage locker with a recess for suitcases is located behind the rear seat, and is accessible both from the cockpits and the starboard side of the fuselage. Behind this is stowage for a tent, a 10lb. collapsible dinghy and similar articles which might prove of value on journeys in inhospitable regions. The backs of the seats can be removed and laid flat to form with the seat bottoms a make-shift bed.

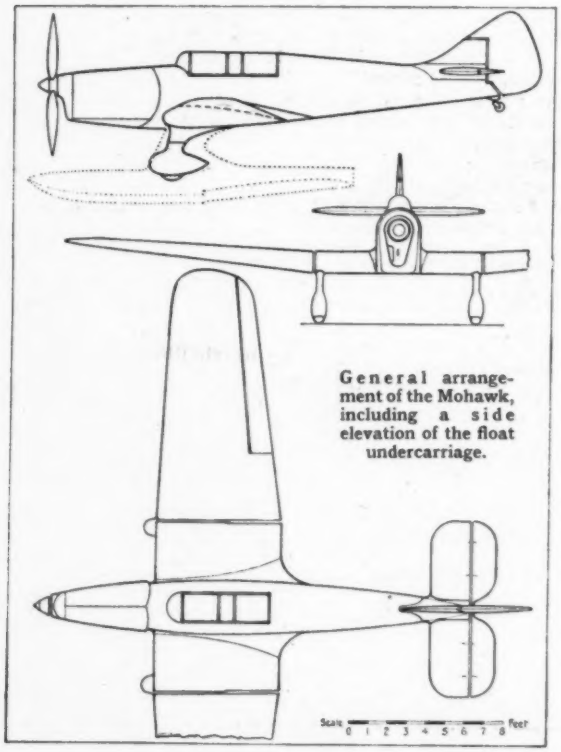


A single-strut Lockheed undercarriage is fitted to the Mohawk.

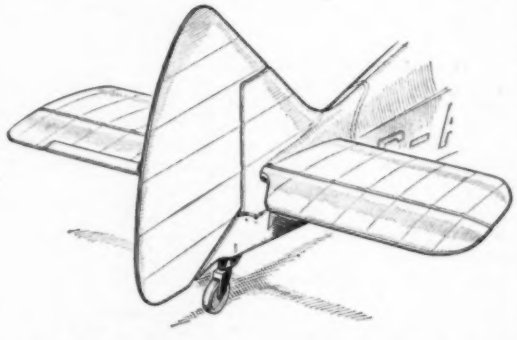
The dual flying controls are conventional, but incorporate a patent Miles tail trimming device. At low speeds the elevator tabs become comparatively ineffective, so the operating gear is planned to adjust the tabs in the normal way at high speeds and at low speeds, for landing, to load the evelator control.

The undercarriage is a single-strut type by Lockheed, incorporating brakes and Airdraulic struts. In view of the fact that this type has also been adopted on the new version of the Hawk Trainer, it may be deduced that future Miles designs using fixed undercarriages will be equipped with something similar. A Short float undercarriage has been designed, and is particularly noteworthy in that there are no cross struts. Large fairings cover the groups of attachment struts.

Among the items of equipment introduced at the express



General arrangement of the Mohawk, including a side elevation of the float undercarriage.



The neat installation of the Mohawk's swivelling tail wheel.

Attractive in appearance as well as performance the Mohawk will doubtless become the envy of many a private owner.
(*Flight* photograph.)

wish of Col. Lindbergh are three parachute flares mounted horizontally in the rear end of the fuselage. These flares are made by the International Flare Signal Co., of Tippecanoe City, Ohio, U.S.A., and are fired electrically from the sides of the machine, travelling about 40ft. before blossoming out. The great advantage of this type of installation is that the flares do not lose altitude before giving their light and do not tend to vibrate out of the machine.

Complete performance figures have not yet been taken, but the maximum speed is believed to be in the immediate neighbourhood of 200 m.p.h. With the ample wing area and the Miles split flaps the landing speed should be quite low.

MILES MOHAWK.
Two-seater Touring Monoplane.
Menasco Buccaneer B6-S (200 h.p. at 4,500 ft.)

DIMENSIONS.

Span	35 ft.
Length	25 ft. 6 in.
Height	6 ft. 6 in.
Wing Area	182·75 sq. ft.
Dihedral	6 deg.
Incidence	1 deg. 15 min.

WEIGHTS.

Tare weight	1,605 lb.
All-up weight	2,700 lb.

PERFORMANCE.

Maximum speed	about 200 m.p.h.

AN AMBASSADOR-at-LARGE

(*Concluded from page 470*)

Piccard in the last issue of the Journal of the Aeronautical Sciences, in which he explained that trouble with the oxygen supply had also been found in ballooning. As the craft descends from a higher to a lower level, the oxygen ceases to boil, owing to increased atmospheric pressure. In addition, the cold liquid begins to condense nitrogen and oxygen at its surface. Air is even sucked back from the gas mask into the bottle. [Professor Piccard's article deals with liquid oxygen, whereas, if we are not mistaken, Sqn. Ldr. Swain's supply was a compressed gas.—ED.]

In proposing a vote of thanks to Sir Robert McLean, Mr. C. R. Fairey said that evening was a unique function in that it was given in honour of the man who had brought two great industries together. If he continued his good work, he might even bring the two peoples together. Of Sir Robert, Mr. Fairey said that much had been said that evening about science and what it had done for aviation. That was insignificant compared with what Sir Robert McLean had done for British aviation as chairman of the Society of British Aircraft Constructors.

Our First Air Mail

SPEAKING at a dinner given by the Air Mail Society in London last week in honour of Sir Walter Windham and in celebration of the twenty-fifth anniversary of the first official air mail service in Great Britain, Sir Herbert Samuel said that a quarter of a century ago he had the honour to be the Postmaster-General when that air mail was carried in this country under the auspices of Sir Walter Windham. Now the number of letters which he understood went by air over the British Empire week by week from Croydon amounted to 350,000, apart from Continental mails.

Sir Alan Cobham and Major Alan Goodfellow were among the speakers.

The first of the 1911 mail flights between London (Hendon) and Windsor was made by Gustav Hamel, in a Blériot. A tail wind gave him a ground speed of over 105 m.p.h.

Production Engineers and Rearmament

AERONAUTICAL interests were strongly represented at the thirteenth annual dinner of the Institution of Production Engineers, held last Friday at the May Fair Hotel, London. Lord Sempill A.F.C., President of the Institution, occupied the chair, and amongst those present were Lt. Col. H. A. P. Disney, Chief of Aircraft Production, Air Ministry; Col. Outram, Director of Aeronautical Inspection; Mr. Fairbrother, production manager of Napiers; Air Commodore J. G. Hearson, Mr. E. C. Gordon England of General Aircraft; and Mr. T. C. L. Westbrook of Vickers-Supermarine.

The speeches, too, contained many references to rearmament problems, and Lord Austin, in proposing the toast of the guests, mentioned that the special efforts necessitated by rearmament will prove a severe test to the production engineers, who will be in the nature of a national asset during the next few years.

In proposing the toast of the Institution, H. W. Healy also referred to rearmament, and remarked that he feels confident that if national needs demand it, production engineers would attain a standard that is far above the high level set by their predecessors in the Great War years.

Amongst certain awards distributed during the evening was the Lord Austin prize, which the donor presented to Mr. R. M. P. Misra, of the De Havilland Company.

The Third Oasis Meeting

THE Royal Aero Club of Egypt has asked the R.Ae.C. to notify intending entrants that no expenses will be entailed by the competitors during the Third International Oasis Meeting other than the cost of fuel needed during the races, and that this fuel will be supplied to them at reduced prices.

Two of the personnel of each aircraft, viz., the pilot and a passenger, will be the guests of the Royal Aero Club of Egypt throughout the meeting.

The event will take place at Cairo next February. Conditions may be obtained on application to the Royal Aero Club, 119, Piccadilly, London, W.1.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers not necessarily for publication, must in all cases, accompany letters intended for publication in these columns.

THE PRIZE TO THE NOT-SO-SWIFT?

"CAMEL VINTAGE," writing in the issue of October 22, would appear to be one of the "old school" who can visualise their ideal flying machine only in terms of fixed wings.

Or can it be that he has never heard of the Autogiro, the normal slow-speed characteristics of which more than fulfil his very modest requirements?

With this type of aircraft, at any rate, there is no snag about the execution of vertical descents in rough weather, simply because control and stability are quite independent of forward speed.

Whilst hopeful, but nevertheless doubtful, that "Camel Vintage" will now express a desire to sign along the dotted line, I am quite willing to vouch an opinion that his plea to the designers of aeroplanes will fall on deaf ears.

All the same, his suggestion of a big cash prize competition to encourage slow-speed performance might prove that I am mistaken in my opinion of the capabilities of the aircraft industry, so in case some rich sportsman can be persuaded to do the necessary, I am anxious to assure "Camel Vintage" that he can be certain of at least one entrant.

With a kind of feeling that the money is already in the bank, I venture to offer guidance about the rules, which, to be in keeping with the simple objects and nature of the competition, should be also unusual and simple.

To make it really representative the contest should be open to the world, and its nature and objects could quite easily be framed around a formula based on "the shortest distance in the longest time."

This would, of course, include the distance (if any) required for the take-off and landing runs, and, as the inner boundary of one side of an aerodrome to the other should suffice for the course, the only requirements of the judges need be a stop-watch, a straight eye and a pedometer.

It would be advisable to ensure that the selected aerodrome was one completely surrounded by houses and/or trees, as this would help the judges to frustrate the normal deception practised by slow-flying at height.

A further advantage of this regulation, especially if the contest should take place on a really windy day, would be that the competitors would encounter a mixture of gusts and cross-purpose winds sufficient to fill most designers with apprehension, the spectators with merriment, and, last but not least, the scrap merchants with joy.

Consequently, although modesty forbids that I should be bold enough to attempt to obtain a free advertisement for the winning machine by divulging its name, I will at this stage veil its identity by signing myself R. A. C. BRIE.

Twickenham,
Middlesex.

THOSE CIRCUITS

"INDICATOR'S" remarks on the subject of the circuit, and those of Mr. George S. McCann, will doubtless find a sympathetic response in the breast of many a flying pupil. I myself am in the half-fledged stage between first solo and A licence, when the circuit cannot yet be relegated to the realm of "old unhappy far-off things and battles long ago," and I can testify to the depressing effect of the monotony plus nerve strain of circuit after circuit. Indeed, it was only during my second solo, when I was sent up to play for half an hour in the sky, that I discovered that flying could be a pleasurable occupation.

The usual procedure seems to be based on the following line of thought:—

The pupil must learn to do approaches.

The pupil must learn to do landings.

The pupil wants to qualify in the minimum number of flying hours.

Therefore the more landings and approaches the pupil can do to the hour the better.

This sounds like logic, but is it sense? It is not the number of landings behind the pupil that gives him confidence and skill, but the number of *good* landings, and good landings are only accomplished when he is feeling happy and free from strain.

Instructors are a race for whom I have the greatest admiration. Their flying skill alone puts them straight into the class of supermen: their patience, often under great provocation, is beyond praise: their gift for detecting what the pupil is doing wrong is often uncanny, and as psychologists they are sometimes brilliant. It is with all deference, therefore (now that others have started the ball rolling), that I offer them the following tips for "flying without tears":—

(1) When the pupil is doing badly, at circuits or anything else, do not keep him at it for an hour or so, either as a punishment or because you hope he will do better, because he almost certainly will not. The only result will be to intensify his inferiority complex and deepen the track of his bad habits, and the hour will be worse than wasted. If he shows no improvement in a quarter of an hour, either put him down or let him practice something else, either something he is good at, to restore his confidence, or something new which he cannot be expected to do well.

(2) The approach, especially on a small or difficult aerodrome, calls for all the pupil's energies, and he may well be so exhausted by the strain that he is not in a fit state to make a good attempt at landing. Why not, in the early stages, teach the circuit and the landing separately? When teaching landings fly round the circuit for the pupil, and only hand over the controls when you are gliding in at the right height.

(3) Bring a little variety and interest into the pupil's lot by occasionally giving him a spot of cross-country flying, even before the first solo. It will make him feel that flying is not all strain and worry.

(4) Then those endless consecutive turns, second only in horror to the circuit. Do you realise that sometimes to the dizzy pupil's eye the horizon is rocking like see-saw? Have pity, and let him fly straight a little while after every two or three turns.

(5) Do not concentrate entirely on his faults; if he does anything well, tell him about it. A little praise may have a tonic effect which will surprise both him and you. And remember that either fault-finding or praise is better than a damning sort of silence, from which he learns nothing.

(6) Lastly, though the pupil may seem to you an obstinate, ham-fisted oaf, or a dithering dunce, try and remember that he is almost certain to be trying his very utmost to do what is required of him.

I know well that none of these ideas is original, that individual instructors here and there put them into practice, but the fact remains that the majority do not. TADPOLE.

London, N.5.

IN BRIEF

"ADVENTURE," c/o the Editor, is anxious to find a co-pilot and navigator (sharing expenses) to join a party for a 5- to 6-week Christmas holiday flight to Africa in a five-seater twin-engined machine, conducted "in an adventurous spirit."

Mr. Schlesinger's Generosity

MR. I. W. SCHLESINGER has addressed a communication to Mr. W. Lindsay Everard, M.P., Chairman of the Royal Aero Club, outlining his wishes in regard to making provision for the widows of Capt. Max Findlay and Mr. A. H. Morgan, who lost their lives at Abercorn, Northern Rhodesia, whilst competing in the England to South Africa Air Race.

Mr. Schlesinger desires that £2,000 each should be paid to Mrs. Max Findlay and Mrs. A. H. Morgan and, further, that the sum of £2,000 should be placed in trust for the child of Capt. Findlay.

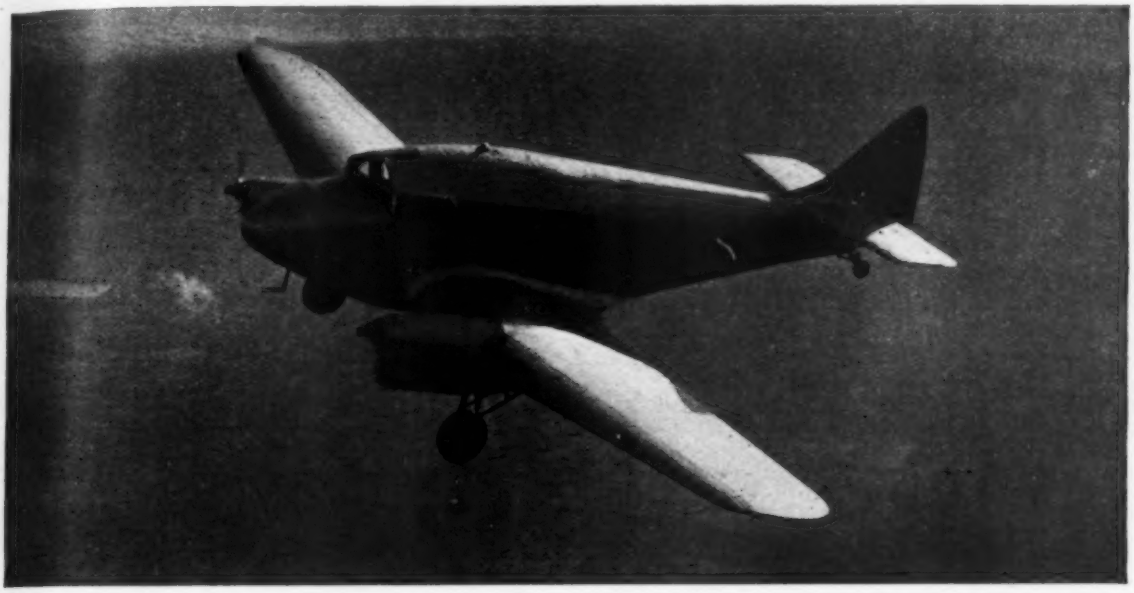
It is Mr. Schlesinger's particular wish that the distribution of these moneys should be made through the Royal Aero Club, and the club has expressed its willingness to do this.

Useful Diaries

A PARTICULARLY useful set of pocket-book diaries, each dealing specifically with affairs within its own sphere, have been issued by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, at 1s. 6d. each. These are *The Autocar*, *The Motor Cycle*, *The Wireless World* and *The Amateur Photographer* Diaries. Each contains an immense amount of really useful information and data.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



BIGGER BY MILES: The first flying picture of an often discussed but rarely seen addition to the Miles family—the Peregrine. Still characteristically Reading-bred, this light transport monoplane has a maximum speed of 180 m.p.h. (*Flight* photograph.)

THE WEEK AT CROYDON

Dropping in from Newfoundland : The Blind-Approach System in Action : Nothing Broken : De-bogging a Douglas

WITH something of the air of one who has motored from Brighton after a good week-end in order to keep a moderately important business appointment, Mr. James Mollison dropped in on us here at a few minutes before 10 a.m. the other day. Not only did he thus become famous as the first man (for a long, long time, anyway) to arrive at his declared destination instead of disturbing the rural tranquillity of Pembroke or the piscatorial jollifications of some school of deep-sea fish, but he also achieved immortality as the first man to fly the Atlantic in one flying boot.

Unfortunately, most of the airport staff and all the passengers of a 10 a.m. departure disappeared from sight after his arrival. I'm told that the manager of the line concerned used some harsh expressions, amongst which was one great truth, to the effect that an air service on a regular schedule route is more important than ninety and nine Atlantic flights.

Capt. Bebb, of Olley Air Services, took a special charter in really bad weather last week to Edinburgh, the passengers being Mr. Mollison and Miss Dorothy Ward. So pleased was Mollison with the skill of the pilot that there was some talk of Bebb flying to the Cape with Mollison. Every man to his trade, however, for Capt. Bebb is one of those highly trained, highly skilled special charter pilots who have concentrated on one of the most difficult branches of flying. These men have their own clients, who will hardly fly with anyone else, and Bebb had forward commitments of this nature. Rollason Aircraft Services are servicing Mollison's Bellanca, by the way, and special precautions have had to be taken against souvenir hunters.

As duly reported elsewhere, Air Dispatch, with North-Eastern Airways, and in co-operation with Aberdeen Airways, have just completed a link between Scotland's more remote isles, London, Paris, and Plymouth.

Last week saw what practically amounted to the baptism of the Lorenz system here, for Mr. Walter Mittelholzer took up a Swissair Douglas to test the apparatus. Mittelholzer said that the actual glide path was excellent, and compared favourably with most he had used.

A quaint story appeared recently concerning an Imperial machine flying in a gale, wherein the impression was given that most of the crockery was broken. Reporters should beware, for the steward of that particular ship assured me that no glasses were broken, and, in any case, the crockery is all unbreakable. Remember the African chief who presented Capt. Hersey, of Imperials, with a jewel-encrusted dagger in exchange for a tea cup (of magical properties) which bounced when dropped on a boulder? The offer of a flight left him cold, and the aeroplane seemed to him a mere flying motor car of large size.

Mr. Beckman, of Imperial Airways, who lost a leg in the service of the company, is now fitted with what he describes as a "tin one." He is doing dual at present, and hopes to go solo shortly without walking-sticks. Paddy Flynn, who lost a limb some years ago, gives him fatherly advice, and these two sportsmen threaten to engage in a race quite shortly.

Commercial Aviation

On Saturday a K.L.M. evening departure was considerably delayed for a very unusual reason. The machine became bogged in wet ground. There had been an inch of rain on the Friday and Saturday, and ground which had been fairly recently returfed, and which had been used previously by heavier machines than the Douglas, became a mere morass. The machine, with fourteen passengers, awaited the coach—which also got bogged. Incidentally, the news of the occurrence was first flashed back to the control tower by the radio operator on short wave. It was not long before another Douglas took the load and started to Holland, but it was many hours, even with the admirable assistance of Imperial Airways staff, before the machine was debogged, and many more hours before the passenger car emerged, like some wallowing buffalo from a mud bath.

A. VIATOR.

D/F at Basra

THE new D/F station at Basra has been completed and is shortly to come into operation. Preparations are now being made for the handling and accommodation of the "C" class flying boats. The river and flying-boat basin are being dredged and will be ready for use in the next two or three months, while a slipway is to be also built. On the aerodrome one hangar is almost completed and another is to be erected. The new airport building, with an up-to-date hotel, is expected to be finished by January.

The Boeing Clippers

A FEW preliminary details, indicative of the size and performance of the six Boeing Clippers to be built for Pan-American Airways, have just been released. These flying boats will weigh more than 82,000 lb., and will be capable of carrying more than sixty passengers. There will be sleeping accommodation for forty. Measuring 152 ft. in span they will be 109 ft. long and 28 ft. high, and will have a maximum speed of about 200 m.p.h. The first should be ready in the autumn of 1937.

The machines will be internally braced high-wing monoplanes of all-metal construction with sponsons as lateral stabilisers. As in our own Short Empire boats there will be two decks, the upper housing an elaborate control cabin, crew's quarters and baggage compartment, and the lower containing day and night passenger accommodation, galley, lavatories and dressing rooms. Gangways will be provided in the wings to the engine nacelles to permit inspection and servicing of the engines during flight. The nature of the power plants has not yet been divulged, but according to present ideas it is likely that there will be six engines.

Traffic Control Changes

FOR more than a year transport pilots have been expecting to learn of considerable modifications in the present system of airline traffic control. Perhaps these changes will come gradually and are foreshadowed in three *Notices to Airmen* which have recently been published.

No. 161 concerns alterations in the communication areas for Croydon, Heston and Portsmouth. The former has been amended on the western boundary, which is now a straight line from Kingston to Pevensey Bay, follows the coast to Shoreham and thence southwards to Cap de la Hève. Heston's area takes in Gatwick and the area bounded by lines joining Guildford and Shoreham, and by the Croydon area. Portsmouth's area is bounded by lines joining Bridgwater, Andover, Guildford, Shoreham and Cap de la Hève, following the French coast to Cap de la Hague, and joining this point with Bridgwater. Presumably Bristol will be the next to have its area.

Croydon's controlled zone has been modified to suit, while *Notice No. 162* explains Gatwick's special zone, which is enclosed by Dorking, the Croydon area, Forest Row, and Horsham.

Meanwhile *No. 158* gives details of new rules for Q.B.I. (or "Visibility 3 Minus" as it is now to be officially termed) conditions. Pilots must now report their position and height when entering and when leaving cloud or "3 Minus" visibility, and when deviating or altering height.

Changes have been made in the frequencies used by Barton, Newtownards and Perth, and both Newcastle's and Doncaster's radio stations have been officially opened by *Notices to Airmen*.

Another Indian Service

DAILY air services between Bombay and Poona, and Bombay and Ahmedabad, via Bhavnagar, will start to operate, it is understood, early next year. Arrangements are now being made by a company, known as Air Service of India, Ltd., which has been formed in Bombay. The service will gradually be extended to the Kathiawar ports.

Heston's Future

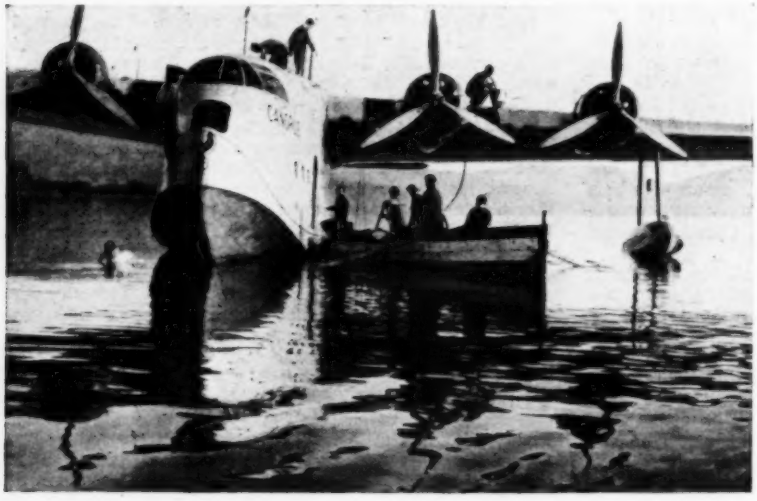
FOLLOWING the statement and editorial comment concerning the future of Heston, which appeared in last week's issue of *Flight*, it would not be out of place to give a brief résumé of the tentative plans which had actually been made for the development of this airport.

In the first place the size was to have been trebled, with runs of 2,000 to 2,260 yards in every direction, and with the greatest extension southward, over the present approach road, and almost to the Bath road at the point where this joins the Great West Road. The field to the east would be taken in, as well as a vast area to the north-west, with carefully arranged open spaces beyond the boundary in essential directions. These extensions would, of course, involve the complete removal of the present control buildings and hangars, which would reappear in a newly planned form at the northern corner—beyond the position at present occupied by the Heston Aircraft Company.

Behind these buildings there would be a new road and a railway station, a branch being taken from the G.W.R. main line which passes through Southall.

In Service

CANOPUS completed her first service trip on the Mediterranean on Monday. On Friday the flying-boat is reported to have covered the thousand miles between Alexandria and Brindisi in 7 hours 20 minutes, making two halts at Mirabella and Athens. The scheduled time of the Scipio class is 12 hours 55 minutes. On her return flight, with two halts, *Canopus* took 8 hours, as against the scheduled 13 hours for the older types.



The first Short Empire boat being refuelled on Lake Bracciana, near Rome.

The D.L.H. Disaster

ON November 1 a D.L.H. Ju.52 flying between Frankfurt and Erfurt crashed into a hillside in the Thuringian Forest near Tabarz. Ten persons were killed, including the crew and one English passenger. There was heavy fog in the district, and it is possible that, as in the case of the American T.W.A. crash at Fairchance, Pa., on April 7, the pilot miscalculated his position and started to lose his height over unexpectedly high ground. The unfortunate part about the disaster was that the machine caught fire; otherwise it is possible that more lives would have been saved. Apparently the undercarriage of the Ju.52 is liable to pierce the fuel tanks in an accident of this character.

Another for the Oilfields

A THIRD De Havilland Rapide left Heston on Thursday of last week for delivery to the Anglo-Iranian Oil Company at Abadan. Like the other two, it will be operated by Airwork personnel on the private business of the oilfields, for which it is equipped with long-range fuel tanks and short- and long-wave radio. It was flown out by Mr. L. H. Weedon, pilot in charge of the Anglo-Iranian Oil Company's flying operations, and carried Mr. C. H. Madle back to his post of Chief Ground Engineer.

To the Races

ABOUT twice a week, between April and October, the D.H. Rapides of British-American Air Services leave Heston with full loads for the races. Last week they ran to Newmarket on the last scheduled services of the year, for shortened daylight in the winter months, and the lack of night flying facilities at many aerodromes make winter services impracticable at present.

Since April 1, forty-five race meetings, totalling no less than 108 days, have been covered by this company, which also provides special air taxis when no fixed service is arranged. Full loads are the rule, and duplicate services generally necessary. Not only races, but many other events of general interest are served by this company.

Winter in Russia

ACCORDING to information published in the Soviet Press, the Deruluft line between the Soviet Union and Berlin will continue to operate throughout the winter. The Central Administration of the Soviet Civil Air Fleet also announces an autumn passenger service between Moscow and Novosibirsk, which started on November 1. A more frequent service will fly throughout the winter on the Moscow-Vladivostok line, and regular winter services will be maintained between Moscow and Kiev, and Minsk and Astrakhan.

The Soviet authorities are also, for the first time, establishing regular winter services to the Arctic. Soon after the closing down of the summer air services on October 10, a regular service of passenger and mail machines will start to operate on the Yenisei, while in December, regular flights will be started on the Omsk, Lena, and other lines in the Far North. The Yenisei line will be from Krasnoyarsk to Dickson Island, with connections over the branch lines Krasnoyarsk-Tura, Dudinka-Nordwick, Krasnoyarsk-Minusinsk and Abakan. The total length of the Yenisei line will be about 4,000 miles. On the Lena line (1,200 miles in length), a regular service will be maintained from Yakutsk to Tixie Bay and over a branch line to Vilyuisk. The Omsk line will run from Tyumen to Novi Port.

Incidentally, the first conference concerning the establishment of regular air communication between the Soviet Union and the U.S. was recently held in Moscow under the chairmanship of I. F. Tkachev, head of the Soviet Civil Aviation Fleet. Two alternative routes were considered, a northern route via Moscow, Krasnoyarsk, Yakutsk, Kresti Kholjai, Oimakon, Nogayevo Bay, Iret, Gizhiga, Anadyr, Cape Lawrence, Nome, Fairbanks, White Horse, Seattle—covering a distance of 8,120 miles; and a southern route covering a distance of 9,240 miles (for the most part over the open sea). The latter route follows the first route as far as Nogayevo, and thence goes to Ust Kamchatsk, the Commodore Islands, the Aleut Islands, Cape Harbor, Seward, White Horse, Seattle. The cost of carrying out preliminary investigation work on the southern route was estimated at 1.4 million roubles, and the cost of equipping the line at 54 million roubles. The corresponding costs on the northern route were estimated at 1.5 million roubles and 60 million roubles, respectively. Most of the experts favoured the latter route as being the most practical.

Preparing for the New Scheme

IN connection with the scheme for Empire air route development a fleet of sixty high-speed motor boats are on order.

Thirty of these are of the "Control" type, built by the British Power Boat Company, and the first is on its way to Bermuda. Equipped with two-way radio, visual signalling and searchlights, they will control all operations at the bases and will transport passengers and mail between shore and flying boat. The speed, with two 100 h.p. "Power" Meadows engines, will be 28 m.p.h. with two tons of load.

The second batch of thirty are "Auxiliary" launches with lighter equipment and will be used to clear landing areas, police the flying-boat base and assist the "Control" boats.

The first of the new "through" services will be to the Cape and is scheduled to start on April 1 next year. First-class mails will be carried twice a week with time gradually lowered to 4½ days for the whole trip. The route will be from London to Cairo, down the Nile to Nairobi, across to Mombasa and then along the east coast to Durban. The present British service ends at Johannesburg, where the mails are taken over by South African Airways.

Finnish Prospects

THERE is quite an interesting little history behind the announcement that the De Havilland Aircraft Company has sold a Rapide to Aero O/Y, Finland.

For many years A B. Aerotransport and Aero O/Y have operated a summer service with Junkers' seaplanes between Stockholm, Abo, Helsingfors and Tallinn. Hard winter conditions and the fact that there were no land aerodromes prevented the operation of a winter service between these points. Now, however, Stockholm's airport at Bromma is in working order, both Tallinn and Abo have theirs, and that at Helsingfors will probably be in use before the new year.

Furthermore, plans have been maturing in the matter of an internal service to link industrial towns such as Tampere and Kouvola with Helsingfors, and the idea may be developed if such a series of services can be carried out with the very modest subsidy—the lowest in Europe—obtainable from the Finnish Government. The chairman of Aero O/Y, Mr. Ehrnrooth, the managing director, Mr. Gunnar Stahle, and the chief pilot recently visited several factories in England, eventually purchasing a Rapide for experimental operations.

This machine will be a 6/8-seater, complete with full blind flying equipment and Marconi two-way radio, and a set of skis may also be ordered for special charter work. If the experiment is successful another four or five of these machines may be ordered. The choice of a British machine has, of course, been based on the necessity for economical operation, and this small beginning may lead to much bigger all-the-year-round operations.

The Institute of Metals

"METALLURGY in the Automobile and Aircraft Industries," is the title of a lecture to be given by Mr. H. C. Hall, M. Met., before the Manchester Metallurgical Society, on February 17. The Society is affiliated to the Institute of Metals, and particulars of the lecture programmes of the various local organisations under its ægis are obtainable from the secretary of the Institute, Mr. G. Shaw Scott, M.Sc., 36, Victoria Street, Westminster, London, S.W.1.

B.S.A. Steel Developments

IT is announced that Mr. Lewis Chapman has resigned from the board of the Birmingham Small Arms Company, Ltd., owing to his whole time being required by the immensely increased activity of the steel companies contained in the B.S.A. group.

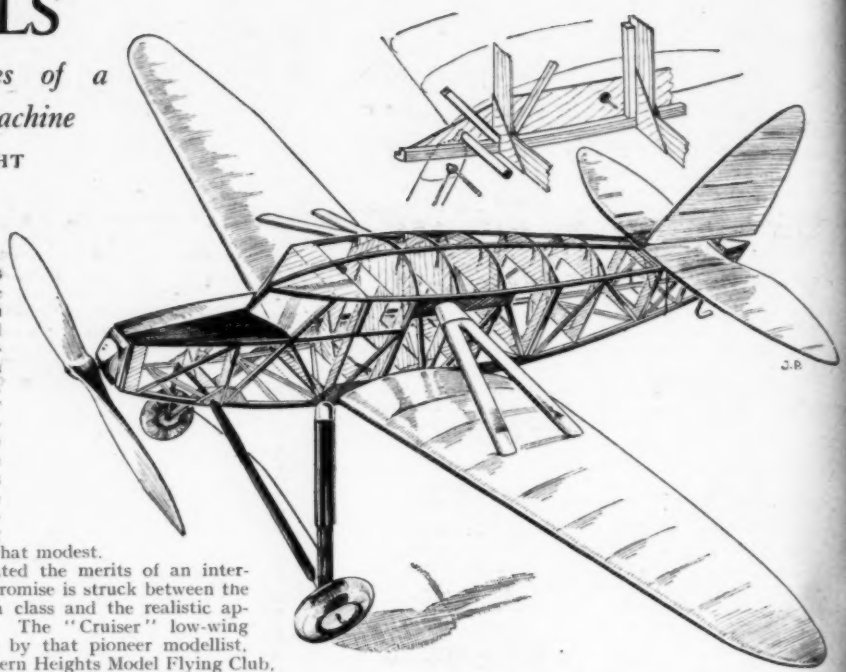
Mr. Chapman is managing director of William Jessop and Sons, Ltd., and J. J. Saville and Co., Ltd., both of which are controlled by B.S.A., Ltd., but have works in Sheffield away from the Birmingham and Coventry works of the latter concern.

William Jessop and Sons, Ltd., founded 160 years ago, were pioneers in the fine steels industry. With the great development in the demand for special steels, particularly for aero-engine construction and for the machine tool industry, this company and J. J. Saville and Co., Ltd., are becoming increasingly important factors in B.S.A. affairs.

MODELS

Interesting Features of a "Semi-scale" Machine

By M. R. KNIGHT



A Realistic Low-wing Monoplane

THE majority of the models in use to-day are of the severely practical duration type, capable of prolonged soaring flights, but quite unlike the full-size aeroplane in their lines and proportions, and deriving their beauty from the delicacy of the workmanship. At the opposite extreme there is a considerable and growing interest in models which bear a more or less close resemblance to various full-size designs, but the flying performance of which is somewhat modest.

The writer has long advocated the merits of an intermediate class, in which a compromise is struck between the lengthy flights of the duration class and the realistic appearance of the scale model. The "Cruiser" low-wing monoplane designed and built by that pioneer modellist, Mr. C. A. Rippon, of the Northern Heights Model Flying Club, is an outstanding representative of that sadly neglected "compromise" class. Such a machine affords considerable scope for interesting construction, as is evidenced by the strut-braced wings, telescopic undercarriage, and glazed cabin. Yet flying performance is far from negligible, flights of over a minute in duration having repeatedly been obtained with the "Cruiser." This is made possible by the extensive use of balsa, albeit reinforced at vulnerable points with birch, which has enabled a wing loading of 4½ oz. per sq. ft. to be achieved without any suspicion of flimsiness. The covering material is the excellent "Mikasa" Japanese paper—midway between ordinary Jap tissue and bamboo tissue in weight and strength—though possibly the slight extra weight of bamboo paper might be worth while for the fuselage. The model has a wing span of 47in., and an overall length of 33in.

The shapely fuselage consists of eight bulkheads of 1/16in. balsa sheet, the mitred corners being reinforced with diagonally placed strips of the same material, four longerons and a stringer of ⅛in by ⅛in. balsa, and generous balsa cross-bracing. The longerons are faced with 1/16in. birch along the fuselage sides. The cabin roof is of balsa sheet, and the windows are glazed with stout celluloid.

The manner in which the wing halves are attached to the fuselage overcomes the unyielding tendency of strut-bracing. Two wire prongs projecting from the main balsa T-spars push into holes in a strip of 1/16in. birch plywood on each fuselage side, and rubber bands passing beneath the fuselage are anchored to small hooks on each wing half. Additional holes enable the wing position to be varied. The elliptical struts, made by rolling gummed parcel tape, terminate in prongs which push into holes in a plywood strip fastened to the top longerons, and are secured with rubber bands passing over the fuselage decking. This constitutes an effective shock-absorber system, the wings being enabled to swivel laterally and longitudinally and knock off without damage. The leading-edge is of $\frac{3}{16}$in. by $\frac{3}{16}$in. balsa rounded off, the ribs are cut from $\frac{1}{16}$in. balsa sheet, and the trailing-edge of $\frac{1}{16}$in. by $\frac{1}{16}$in. birch merges into the leading-edge, and is reinforced between the ribs with thin balsa. The leading-edge is swept back, the trailing-edge sweeps forward, gently at first, and more sharply towards the slightly washed-out tips. There is about 9 degrees of dihedral, and the mean chord is 6in.

Tail-plane and fin have $\frac{3}{32}$in. by $\frac{3}{32}$in. birch edging, balsa spars and ribs, and are each detachable from the fuselage. The airscrew diameter is restricted to 12in. for the sake of appearance, and this functions satisfactorily, but even better results are obtainable with a 14in. airscrew. The motive power is provided by ten strands of ¼in. flat rubber in a single skein.

Not infrequently one finds an otherwise realistic model marred by a stilty wire undercarriage. The "Cruiser" has an undercarriage which is as pleasing as it is effective. It employs rubber springing in telescopic tubes made from gummed parcel tape. The way in which vertical and longitudinal travel are secured without the rubber jamming in the tubes is highly ingenious. The front legs are of bamboo, the axle of steel wire, and the 2-in. wheels of celluloid.

Recent Record Flights

EVEN without considering the Wakefield Cup victory, the 1936 season has been one of outstanding progress, the latest instance being the recognition last month by the S.M.A.E. Council of no fewer than nine records. In the Scale Model category Mr. W. L. Henery (T.M.A.C.) achieved 59.5 sec. with the large Leopard Moth recently described in *Flight*; Mr. G. J. Liggitt (I.M.A.C.) raised the seaplane record to 153.8 sec., Mr. S. R. Crow (Blackheath M.F.C.) raised the Autogiro records to 29.3 sec. R.O.G. and 49.9 H.L., Mr. H. E. White (Northern Heights M.F.C.) established biplane records of 79 sec. R.O.G. and 93 sec. H.L., Mr. Crow promptly raised the biplane R.O.G. record to 91.2 sec., and Mr. C. A. Rippon (N.H. M.F.C.) achieved 51 sec. with a fuselage pusher.

Last—but most obviously not least—Mr. R. Copland (Northern Heights M.F.C.), in the Albert Hall, London, raised the indoor tractor spar record to 11 min. 57 sec. with a micro-film-covered model weighing one-sixth of an ounce!

The 1937 Wakefield Cup Rules

WITH the idea of reducing the luck element in the Wakefield and other major contests, the S.M.A.E. has so modified the model specification that skilled design rather than the encountering of thermal currents will be the determining factor. The 1937 Wakefield model must have a wing area of 190-210 sq. in., and a minimum total weight of 8 oz. (the 1936 minimum was 4 oz.). This will have a marked effect on design. Multiple gearing is indicated, possibly with the motor spar favoured in America. Dare we look for some variation from the one-piece high-wing formula?

* * *

Premier Aeromodel Supplies, 2a, Hornsey Rise, London, N.19, have issued an entirely new version of their guide and price list, priced at 3d. In addition to a wide range of silks and tissues, dopes, wood and other essentials, there are innumerable accessories listed such as brass, aluminium and celluloid tubing, gears, engine cowls, besides kits of materials for constructing eight successful models, and details of the Gnome 3½ c.c. two-stroke, and the popular Cleveland Scale Flying kits. There is also a list of clubs and the 1936 competition winners, and highly valuable advice and hints.